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ABSTRACT

This report on the status of telecommunications and information technology in Indian Country was created as a tool for reference, training, planning, and general educational purposes to be used by Native Americans, government policy makers, and others. A background section discusses policy and the current state of Native communities with regard to the use of telecommunications and technology. It offers a guide to the existing legal and regulatory parameters of telecommunications and their implications in relation to Indian law and sovereignty issues. Opportunities available to tribes in the commercial and regulatory arenas are outlined, and implications of telecommunications and technology for Native Americans, both positive and negative, are discussed. A directory of information resources and tools outlines telecommunications and information technology practices in Native communities today and includes funding sources (federal, private, and corporate); current Native American telecommunications projects in the fields of education, community networking, the environment, Geographic Information Systems and Global Positioning Satellite, law enforcement, library and museum services, and telemedicine; and technology-focused Native businesses and organizations. Appendices provide a sample survey from the Office of Technology Assessment report, "Telecommunications Technology and Native Americans," which tribes can use to perform their own technology assessments; a glossary of telecommunications terms; and five additional online references. (TD)

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Native Networking: Telecommunications and Information Technology in Indian Country

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This report began in 1997 as a market assessment conducted by Marcia Warren for Hughes Global Services in Los Angeles, CA, measuring the use of telecommunications and information technology by Native Americans. The result, after three months of research, interviews, and Internet searches, was a study that just scratched the surface of what was really going on in Indian Country today.

Many people saw the value of a more complete report, and Ms. Warren was encouraged to find a way to make the information available to others working with these issues in Indian Country. "Native Networking: Telecommunications and Technology in Indian Country" was completed as a joint effort between the three authors and the Benton Foundation and assistance from colleagues in Indian Country. It is a testament to the work that is done every day to foster the growth and pride of Indians throughout the country.

And consistent with the way we do things in the Native American community, a contribution is always the result of great friendship and cooperation and should be acknowledged. To Roanne Robinson, Alan Mandell, Pat Spears, Bob Gough, Theresa Hopkins, Bill Mehojah, Karen Buller, Frank Blythe, Dave Warren, Alvin Warren, and the rest of the members of "Native Networking"—many thanks for sharing your knowledge and expertise in this endeavor. The authors thank Mark Schwene, Vice President of Hughes Global Services, without whom this idea would have never been put on paper; Andrew Blau, former Director of the Communications Policy and Practice program at the Benton Foundation, who gave us the means to provide this report to the audiences that need it; and Fred Wood, National Library of Medicine and director of the 1995 OTA study, who provided helpful comments on the report.

TABLE OF CONTENTS

I. **INTRODUCTION** 1

II. **BACKGROUND**

How to Use This Report 3

Basic Facts 5

Regulatory Landscape 12

Cybersovereignty and Opportunities for Tribes 15

III. **INFORMATION RESOURCES AND TOOLS**

Funding and Assistance 20

Federal 20

Private 35

Corporate 37

Current Native American Technology and Telecommunications Projects (1994-present) 40

Education 40

Community Networking 42

Environment 45

Geographic Information Systems (GIS)/Global Positioning Satellite (GPS) 45

Law Enforcement 46

Library and Museum Services 47

Telemedicine 48

Native-owned Businesses 50

Computers and Networks 50

GIS/GPS 50

Internet Services and Web Site Development 50

Telecommunications/Microwave/Cellular 51

Tribal Telephone Companies 51

Telecommunications and Technology Organizations (Native-owned and Native-focused) 53

IV. **APPENDICES**

A. Native American Telecommunications Infrastructure: Survey Instrument (OTA Report) 58

B. Glossary of Telecommunications Terms 60

C. Additional Resources 64

I. INTRODUCTION

Any report on telecommunications and information technologies must be considered a work in progress. Definitive information on each industry is quickly outdated. However, once compiled, this information can be updated and used, and therein lies its value.

Any discussion about telecommunications, technology, and Native Americans must begin with an acknowledgment of the landmark work, "Telecommunications Technology and Native Americans" (www.wws.princeton.edu:80/~ota/ns20/year_f.html) published in 1995. This 150-page study from the congressional Office of Technology Assessment (OTA) was the first of its kind, integrating the concepts of telecommunications and technology with Native American issues and activities. It initiated a dialogue, and presented a mandate to both Indians and non-Indians to fully explore the opportunities telecommunications technology could offer.

It is now 1999, and the millennium is quickly approaching. How much progress has been made? What has been accomplished since 1995? Both questions have positive answers, with some caveats.

Overall, telecommunications and information technology in Indian communities is no longer a rarity. A large number of the 550 federally recognized tribes in the United States are involved in some way, ranging from connecting their schools to the Internet to regulating and running telecommunications services in their lands. But there are still many tribes that do not have the funding, the manpower, the time, or the information to get involved with telecommunications and technology. Their priorities are more immediate: improving the welfare of their communities. Fortunately, more Native organizations and businesses are focusing on telecommunications and technology, broadening the options for tribes and acquiring the skills needed to develop their infrastructures. Likewise, federal agencies are utilizing both their technology funds and Indian Affairs offices to extend more opportunities to Native communities. A network of people and expertise is beginning to form, but like all new social structures it will take more time and effort to fully mature.

To answer the second question, what has been accomplished, requires more reflection. On one hand, it would be easy to refer to the "Current Projects" section of this report as a measure of what has been achieved. But in reality, the accomplishments outlined in this report go beyond the simple measure of who is doing what and where. Tribes are entering a new era—an exciting time of emphasizing their identity and potential. As the economic status of Indian people in general improves and their visibility increases, in both the mass media and the political arena, the role of Native American communities within our mainstream society will begin to change. This presents a number of interesting possibilities and dilemmas. Without getting into an extensive discussion of tribal sovereignty issues here, it can be said that a new place for Indians will be carved out of the paradigm that exists today. Telecommunications and information technology will play a large part in this effort, as Indians begin to use these tools to support community-building in all its aspects: economic development, education, health, law enforcement, environmental management, and cultural preservation. New partnerships will be formed and new endeavors, unique to the goals and values of Indian people, will be created.

However, there is another side to this movement. Change creates conflict between the old and new, and there will be issues that only the tribes themselves can resolve: cultural preservation, identity, and values. Are sacrifices being made for the sake of "connectivity?" How much a part of the Information Society does the tribe want to be? What are the risks? What are the benefits? These questions must be addressed by the tribes and the communities they represent, where the dialogue must begin.

It is clear that tribes are moving forward and building a future as economically viable entities within the United States. For the first time in Native American-U.S. history, Indians have the knowledge, the tools, and the political support to succeed. Among the tools recognized by tribes as essential to their future growth are telecommunications and information technology, and tribes are looking for opportunities to acquire the level of technological infrastructure that will ensure their place on the Information Superhighway. However, many tribes are in the early stages of this endeavor and the value of information, education, and networking (both in the human and computer senses) cannot be overestimated. Tribes must begin at home to define the needs and goals important to their communities, and then reach out and forge the relationships necessary to achieve those goals. As well, federal agencies, foundations, businesses, and policy makers must include tribes and Indian people in their scope of telecommunications and technology growth and opportunities. Only then, when these two spheres meet and a new network of relationships is created, will the mandate of the Information Superhighway truly be fulfilled.

II. BACKGROUND

HOW TO USE THIS REPORT

What is this report about?

Native Networking: Telecommunications and Information Technology in Indian Country is a report on the status and resources of telecommunications and technology activity in Indian Country today. Most of the information was gathered from the Internet, as well as from organizations and individuals who contributed their knowledge and resources to this report. Unfortunately, information about telecommunications and technology in Native American communities is greatly lacking. Many statistics, such as telephone penetration rates on reservations, were outdated and incomplete. Others were difficult to find, or simply did not exist. Thus, this report not only reflects the current state of telecommunications and technology in Indian Country; it also clearly demonstrates the need to collect more and better information.

Why has this report been created?

It was created to serve as a central location where Native Americans, government policy makers, and others could access information about telecommunications and information technology resources. The report is designed as a tool for reference, training, planning, and general educational purposes. The information is as complete as possible, concise, and to the point. It is meant to provide busy people with off-the-shelf facts and references that will make their work—and their decisions—easier.

How is it organized?

Section II provides a discussion of policy and the current state of affairs in Native communities regarding the use of telecommunications and technology. It includes a comprehensive treatment of the relationship of Indian law and sovereignty issues within the existing legal and regulatory parameters of telecommunications today. The discussion offers a guide to this complicated system, and it also outlines the various opportunities and actions available to tribes, both in the commercial and regulatory arenas. The section then examines the implications of telecommunications and technology for Indian Country. Both the positive and negative scenarios currently facing tribes are discussed. This section will also include background and guidance information, which is crucial to understanding the context of the issues presented throughout the report.

Section III, *Information Resources and Tools*, is largely a directory, outlining the telecommunications and information technology practices in Native communities today; funding sources (federal, private, and corporate), current projects in Indian Country, and technology-focused Native businesses and organizations are listed. The appendices in Section IV provide a sample of a survey from the OTA report that tribes can use to perform their own technology assessments, a glossary of terms, and additional references.

Who is this report for?

This report was written primarily for the two audiences that deal most with the intersection of the Information Superhighway and Indian Country: 1) decisionmakers in tribal governments and businesses, and 2) policy makers (regulatory and legislative) at all levels of government.

In addition, the following groups may also find this report useful:

- Native Americans involved in education, telecommunications and technology infrastructure development, economic development, law enforcement, health services, and any other organizational structure related to telecommunications and technology.
- Federal grant-giving offices
- Congressional committees
- Local and regional policy makers, regulators, and grant-giving organizations that have Native Americans in their constituencies
- Foundations
- Nonprofit organizations
- Telecommunications and technology businesses
- Advocacy organizations

How can I use the information in this report?

Recognizing that this report contains a great deal of information, the following checklist has been developed as a guide to the reader. The items provide one way to coordinate your thoughts, and may be helpful as a starting point for your own organizational process.

CHECKLIST FOR TRIBES, NATIVE BUSINESSES, AND ORGANIZATIONS

- ✔ Decide whether or not your tribe, business, or organization wants to incorporate technology and telecommunications into its overall goals and functions. If so, the level of involvement and the kinds of activities using these tools must be determined. For example, one tribe may wish to start its own tribal telephone company; another may want to become an active regulator of existing services on its land. Or one school on a reservation may want full Internet access for its students; another may want limited access with adult supervision. These decisions must be made by those directly involved in order to provide the clearest path of action and the most accurate determination of needs.
- ✔ Once your goals and needs have been outlined, evaluate the existing telecommunications and technology infrastructure of your tribe, business, or organization. You may use the OTA survey instrument at the end of this report ("Native American Telecommunications Infrastructure: A Survey Instrument"), construct your own survey, or consult a professional in the field.
- ✔ Based on the results of the evaluation, create a list of priorities for the products and services you need.
- ✔ Develop a budget and timeline to determine the implementation framework you will use to achieve the infrastructure you want.
- ✔ Use the resources in this report and from other sources to find the funding, loans, assistance programs, and/or partnership opportunities that will enable you to achieve your goals.
- ✔ Concurrently, identify any barriers or issues regarding your particular situation and inform your local and state government representatives, as well as Members of Congress and federal policy makers. The more they know about what you are trying to achieve, the better able you and other interested parties will be to begin a process of change.
- ✔ Lastly, create a network of people, businesses, and organizations that will support you in your efforts to integrate telecommunications and technology into your activities. Information is power, and whether it is shared through computer networks or human networks, it is still the most valuable asset to have in any endeavor.

CHECKLIST FOR FEDERAL AND STATE POLICY MAKERS, LEGISLATORS, REGULATORS, AND AGENCIES

- ✔ Actively pursue outreach efforts to communicate with tribes, Native businesses, and organizations regarding the impact of federal and state programs on their telecommunications and technology needs.
- ✔ Provide the means for studies to be done to collect and analyze statistics and demographic information in Indian Country today: for example, telephone penetration rates; percentage of tribal government offices/households/businesses with computers; and the effect of technology on Native communities.
- ✔ Consider the concerns of tribes and Native peoples in legislative, constitutional, and regulatory actions in the areas of telecommunications and technology, and include them in your process.
- ✔ Support pilot programs and test-bed studies.
- ✔ Strengthen the role of each agency's Indian Affairs office that is involved in these issues.
- ✔ Realize that this is an ongoing and constantly changing process. The establishment of an honest and continuous dialogue is the most important goal to achieve.

Where do I begin?

This report is meant to serve as a resource for you. You may begin at any point in the report. It is not necessary to read any one section to prepare for the rest of the book. Go to the section that addresses your needs, and use the information at will.

BASIC FACTS

Before discussing the current state of telecommunications and information technology in Indian Country, it is necessary to provide some context. Like the rest of the country, telecommunications and technology use in Indian Country does not exist in a vacuum, separate from the parts of society that apply them. They are used as communication and knowledge tools to support the building blocks of a community such as education, governance, economic viability, health, environment, and law. These structural foundations that support Indian communities are, in many ways, different from those in the rest of the United States. For this reason, some basic facts and figures will be provided in this section to provide a context for the issues that will be discussed throughout the report.

All information was gathered on the Internet, unless otherwise cited.

History of Contact

Two hundred years ago when the federal government first encountered Native American populations, conflict and a policy of removal, most often by force, became standard procedure. This policy continued throughout the national period of expansion, and hundreds of tribes were almost completely eradicated through war, disease, and numerous relocations to newly established reservations.

By the mid-19th century, the United States adopted a policy encouraging assimilation. This was reflected in the creation of the Bureau of Indian Affairs (BIA) as part of the War Department in 1824, and its transfer to the Department of the Interior in 1849. The BIA's mandate was to act as a trustee for tribal lands and monies, and to encourage and assist American Indians in becoming citizens, undifferentiated from other members of American society.

Slowly, the scope and perception of Indian law and policy changed, notably through the Indian Reorganization Act of 1934 and the Indian Self-Determination and Education Assistance Act of 1975. These laws refocused the issues of Native Americans toward self-governance, autonomy, cultural preservation, and the reclamation of each tribe's future on its own terms.

Today, the federal government has a government-to-government relationship with tribes, as mandated by both the Bush and Clinton Administrations. Each federal agency has, or should have, a primary contact or office for tribes to consult directly.

TABLE 1: Population Profile of Native Americans

Native Americans (total estimated 1990 population)	**Population**
American Indians	1,875,000
Alaska Natives (52% Eskimo, 12% Aleut, 36% Indian)	86,000
Native Hawaiians	211,000
Grand total	2,172,000
Native Americans living in rural or semi-rural areas	
American Indians	
Reservations and trust lands	437,000
Tribal Jurisdictional Statistical Areas (OklahomaTribal	201,000
Designated Statistical Areas	54,000
Other rural/semirural areas (est.)	250,000
Alaska Natives	
Alaska Native Village Statistical Areas	47,000
Native Hawaiians	
Rural/semi-rural areas (est.)	70,000
Grand total,rural/semi-rural	1,059,000

Source: Office of Technology Assessment, 1995, based on information from the 1990 Census of Population in the following U.S. Bureau of the Census documents: Statistical Abstract of the United States, 1994 (Washington, DC: U.S. Government Printing Office, 1994); County & City Data Book, 1994 (GPO, 1994); 1990 Social and Economic Characteristics, Hawaii, 1990 CP-2-13 (GPO, September 1993); and "We the First Americans," September 1993.

Population

The federal government currently recognizes more than 550 Indian tribes, including 220 Alaska Native tribal or village governments (Indian, Aleut, or Eskimo). Population figures tallied by the 1990 Census show that the total Native American population is 2,172,000, with approximately half residing in rural or semi-rural locations west of the Mississippi River *(see Table 1)*. The population of individual tribes can range in size from the 220,000 members of the Navajo Nation to only several

HISTORICAL OVERVIEW OF

Present— 1982—				
1982— 1980— 1970— 1968—				
1968— 1960— 1953—				
1953— 1930— 1928—			**INDIAN REORGANIZATION** (1928 to 1953)	
1928— 1911— 1901— 1891— 1881— 1871—		**ALLOTMENT & ASSIMILATION** (1871 to 1928)		
1871— 1860— 1800— 1776—	**FORMATIVE YEARS** (1776 to 1871)			
Telecommunication Policy			Communications Act of 1934 enacted. No specific policy for Native Americans defined.	
Enactment of Telecommunication Policy				
Federal Policy	Tribal sovereignty and respect for traditional forms of self-government. Movement to reservations.	Attempt to destroy self-government and diminish tribal land base.	Renewed respect and recognition of tribal sovereignty and the right to self-government.	
Enactment of Federal Policy	1. Treaties and other agreements. 2. Congress defines 'Indian Country.' 3. Passage of the first Non-Intercourse Act (1791). 4. Passage of the General Crimes Act (1817). 5. Bureau of Indian Affairs created as part of War Department in 1824; becomes part of Dept. of Interior in 1849. 6. Indian Removal Bill (1830) 7. Cherokee Cases (1831-1832).	1. End of treaty-making (1871). 2. Crow Dog Case (1883). 3. Counts of Indian Offenses established (1883). 4. Indian Citizenship Act (1924). 5. Passage of Major Crimes Act (1885). 6. Passage of the General Allotment Act (1887). 7. Passage of the Assimilative Crimes Act (1808).	1. Merriam Report (1928). 2. Passage of the Indian Reorganization Act (1934).	

Source: This table is based upon an original work by the Falmouth Institute, Inc. based in Fairfax, VA.

FEDERAL INDIAN POLICY

		SELF-GOVERNANCE (1982 to Present)
	INDIAN SELF-DETERMINATION (1968 to 1982)	
TERMINATION ERA (1953 to 1968)		
(no activity)	FCC adopts a policy in 1978 to promote participation of minorities in broadcasting (little effect on Native American broadcasting ownership).	FCC's spectrum auction policy extends preferences in 1994 to minorities and certain disadvantaged individuals/entities to assist in the purchasing of Personal Communications Systems (PCS). Telecommunications Act of 1996 establishes Federal-State Joint Board to define and implement 'universal service'. **Native American Telecommunication Act of 1997** (H.R. 486 and 555) is introduced to House of Representatives.
		1. A few tribes participate in FCC's Cellular Spectrum Lottery in 1988, setting up telephone companies. 2. Funding through Dept. of Commerce, Dept. of Education, and Dept. of Agriculture for technology and telecommunications is utilized by tribes from the early 1990's to the present.
Another attempt at assimilation of Indians and destruction of tribal government.	Re-affirmation of tribal sovereignty and right to self-government.	Continuation of self-determination but with a stronger recognition and assertion of self-government.
1. Passage of H.C.R. 108 Termination Resolution. 2. Relocation of Indians to urban areas. 3. Passage of laws to terminate over 100 tribes. 4. Passage of Public Law 83-280 (1963).	1. Passage of the Indian Civil Rights Act (1968). 2. Nixon's message on Indian Self-Determination. 3. Passage of Indian Finance Act (1974). 4. Passage of Public Law (P.L.) 93-638 on Indian Self-Determination Act (1975). 5. Martinez Decision (1978). 6. Indian Child Welfare Act (1978). 7. American Indian Religious Freedom Act (1978)	1. Tribal Tax Status Act (1982). 2. Tribes open bingo halls. 3. Cabazon Case (1987). 4. Indian Gaming Regulatory Act (1988). 5. Amendments to P.L. 93-638. 6. Self-Governance Demonstration Project (1988). 7. Duro vs. Reina (1990). 8. Congress changes Duro P.L. 100137 (1991).

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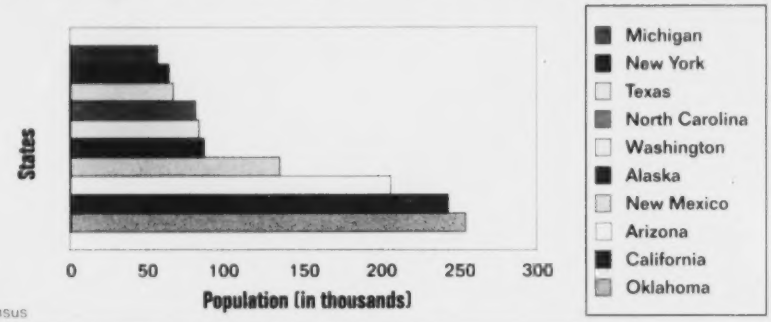
FIGURE 1. Ten States with the Largest Number of American Indians, Eskimos, and Aleuts



Source: 1990 Census

members in small "rancheria" communities in California *(see Figure 1 and Figure 2)*. Population estimates calculated by the Census place the Native American population at 2,369,000 in November 1998, with the projection that it will reach 4,300,000 by the year 2050.

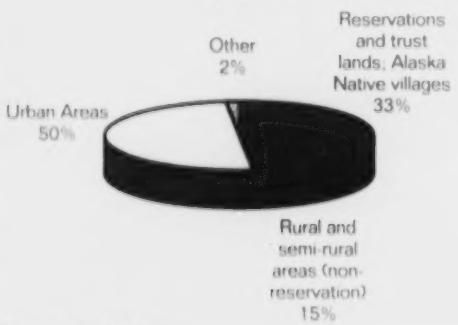
Of the total Native American population, 39 percent is young: under 20 years old in 1990 (compared with 29 percent of the U.S. total population). The median age is 26 years old, compared with the U.S. median age of 33.

Languages and Dialects

Census information from 1990 showed that there were more than 250 living Native languages and dialects spoken by approximately 282,000 individuals throughout Native communities today. For regional figures, *see Table 2*.

Natural Resources

FIGURE 2. Distribution of Native American Population



Source: 1990 Census

The reservation system comprises some 53 million acres, about 2.5 percent of the entire surface area of the United States and about 5 percent of the

TABLE 2: Native Language Use: Regional & Population Distribution

Region	# of individuals over the age of 5 who speak an American Indian language at home
Northeast	5,195
Midwest	23,618
South	29,466
West	223,711
TOTAL	**281,990**

Source: Bureau of the Census, Economics and Statistics Administration, U.S. Department of Commerce, *American Indian Languages Spoken at Home by American Indian Persons 5 Years and Over in Households*: 1990. Data are estimates based on a sample. (www.census.gov/population/estimates/socdemo/race/indian/ailang3.txt, August 1995)

West. Add to that the 44 million acres that will be transferred to Alaskan Natives by the end of the century, and the many land claims currently unresolved in many states on the eastern seaboard.

The potential for development on Indian reservations is great: tribes have large mineral holdings (10 percent of the nation's coal, 10 percent of the oil, and at least 16 percent of the uranium), as well as 1.5 percent of the country's commercial timber and 5 percent of the grazing land. And tribes have first call on the water in many rivers in the western half of the country.[1]

U.S. Congress, Office of Technology Assessment, *Telecommunications Technology and Native Americans: Opportunities and Challenges*, OTA-ITC-621 (Washington, DC: US Government Printing Office August, 1995): 20

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Education

The Native American education system encompasses K-12 schools, tribal colleges (two-year institutions), and four-year colleges. The majority of these institutions are administered by the Bureau of Indian Affairs' Office of Indian Education Programs (OIEP); the tribal colleges however, are run directly by tribes.

The statistics compiled by the 1990 Census show that Native Americans have a lower overall percentage of graduation rates compared with the rest of the nation. For high school, 65 percent of Native Americans earned their diploma, versus 75.2 percent of students in the United States. The college graduation rate for Native Americans was 9.3 percent (versus 20.3 percent in the United States) and 3.2 percent (versus (7.2 percent in the United States) for graduate or professional degrees.

However, the picture changes when one looks at graduation rates for tribal colleges: more than 30 percent of Indian students in tribal colleges go on to further their education, and 90 percent of tribal college graduates find employment. According to the American Indian College Fund, this is a direct result of the increased quality and availability (including scholarships) of education provided by the 30 tribal colleges in the United States today.[2]

Bureau of Indian Affairs (BIA). The Office of Indian Education Programs (OIEP) serves 49,218 K-12 students and 25,000 post-secondary education students in Bureau-funded schools, community colleges, and universities. This includes students in dormitory programs who attend public schools, and 10,463 students in residential programs operated or funded by the BIA. Approximately 5,000 teachers, administrators, counselors, and support personnel serve the students in the BIA school system.

The BIA directly operates 82 elementary and secondary schools, and funds 105 elementary schools that are operated directly by tribes under contract or grants. These 187 schools (elementary, secondary, and boarding) are located on 63 reservations in 23 states, and 93.5 percent are state and/or regionally accredited. To accommodate Indian students who attend nearby public schools, nine peripheral dormitories have been established on reservations. These are funded by the BIA and are tribally operated under contracts or grants. In addition, the BIA funds seven off-reservation boarding schools, four operated by the BIA and three operated by tribes through contracts.

Additionally, the BIA funds 24 tribally controlled community colleges and operates two: Haskell Indian Nations University and Southwestern Indian Polytechnic Institute. In 1997, enrollment at these two institutions reached 1,501 full-time students.

According to the BIA's 1997 Goals 2000 Report Card, the BIA has implemented the following reform strategies into their school system:

- Goals 2000/School-wide Title I/Professional Development
- Technology Literacy Challenge Grants/Access Native America Initiative
- Indian Content Standards (developed in eight areas)
- Performance-Based Assessment - Learning Record System
- Restructuring of Central Office: two School Reform Teams and one Special Projects Team now in place

Tribal Colleges. There are currently 30 tribal colleges located across the country. The colleges serve 26,000 students, ranging in ages from 17 to 70, and offer mainly two-year programs with associate degrees. However, four of the colleges offer Bachelor's degrees, and two have Master's programs.

TABLE 3: Economic Profile of Native Americans

	Native American	United States
Per capita income	$8,234	$14,420
Per capita income of American Indians on reservations or trust lands	$4,478	
Unemployment rate	14.4%	6.3%
Poverty rate	31.0%	13.0%
Median family income	$21,750	$35,225
Median married-couple family income	$28,287	$39,584
Median income for families maintained by a female householder with no husband present	$10,724	$17,414

Source: 1990 Census

[2] Lance Thompson, "Winona Ryder Joins a Cause: A Popular Hollywood Star Works her Magic to Help Tribal Colleges," *Cowboys and Indians*, Sept. 1988: 84-90.

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Access to Basic Services

Indian and Alaska Native people live in some of the most geographically remote areas of the country. Most Alaska Native villages are reachable year-round by air only, have limited access by water, and have no road connections. On the mainland, many Indian reservations are located west of the Mississippi, where the wide-open spaces often mean that the nearest town, city, or hospital is several hours away by car.

Communications Services. In 1995, the Department of Commerce's Economic and Statistics Administration (ESA) released a Statistical Brief prepared by the Bureau of the Census that cited that 53 percent of Indian homes on reservations *did not* have a telephone (figures were based on 1990 Census information and were conducted on a sample of reservations that had 500 or more households).[3] *(See Table 4.)*

In comparison, only 5 percent of homes in the United States were without a telephone. Even in rural locations, which may serve as a better comparison to telephone penetration rates on reservations, only 9 percent of homes were without a telephone.

This report does not address the reasons for the low penetration rate of telephones in Indian communities today. Unfortunately, no current data or comprehensive studies exist to answer this question.

On August 6, 1998, President Clinton directed the Secretary of Commerce to report on the state of technology infrastructure needs in Native American communities. This report is being prepared in collaboration with tribal governments and the Department of the Interior. The U.S. Department of Commerce's Economic Development Agency (EDA) is coordinating the project, and the final product is projected to be completed by May 1999.

Health Care Services. The Indian Health Service (IHS) is the principal federal health care provider and health advocate for approximately 1.5 million American Indian and Alaska Native peoples who belong to more than 550 federally recognized tribes in 34 states.

IHS services are provided directly and also through tribally contracted and operated health programs. Health services also include health care purchased from more than 2,000 private providers. As of March 1996, the federal system consisted of 37 hospitals, 64 health centers, 50 health stations, and five school health centers. In addition, 34 urban Indian health projects provide a variety of health and referral services.

The IHS clinical staff consists of approximately 840 physicians, 380 dentists, 100 physician assistants, and 2,580 nurses. IHS also employs allied health professionals, such as nutritionists, health administrators, engineers, and medical records administrators.

Access to the Internet and Other Network Systems

Tribal Schools and Colleges. Out of the 185 schools supported by the BIA, 76 schools are connected to the Department of Interior (DOI)'s Internet service ("DOINet"). The majority of those are connected by fractional T1 lines.

Of the total, 104 (including the 76 mentioned above) have cable "drops" in the classrooms to connect computers once the facilities and equipment are ready to do so (some schools are currently undergoing construction).[4]

Hospitals and Clinics. The Indian Health Service has more than 550 "nodes" connected to its closed-network system. These nodes are defined as help facilities, hospitals, and clinics, and are located throughout the country. The IHS network allows patient data to be transferred between health facilities, as well as administrative and financial data to be passed from the health facilities to the 12 area offices, and then to mainframe computers where accounting and third-party billing is processed. The network also provides e-mail and Internet connectivity to all facilities.

The IHS is working on an agreement with the BIA and the Navajo Nation to share data lines in an effort to reduce costs. Lines are already being shared within the Navajo Nation and between Albuquerque, NM, and Aberdeen, SD.

The IHS also provides teleradiology from the Shiprock, NM, hospital to the University of New Mexico.[5]

Tribal Governments and/or Official Tribal Web Sites. TribalWeb, a page on the Web site of the Seminole Tribe of Florida, currently provides a list of federally recognized tribes and Alaska Native villages. From this list, the tribe has highlighted links to tribes that have official Web sites, which the tribe itself confirms for authenticity. As of August 1998, this site shows that approximately 100 tribes (out of 550) have official Web sites accessible to the public.

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[3] Bureau of the Census, Economics and Statistics Administration, U.S. Department of Commerce, *Housing of American Indians on Reservations: Equipment and Fuels* (Statistical Brief), April 1995.

[4] William Mehojah, Office of Indian Education Programs, Bureau of Indian Affairs, personal interview, June 1998.

[5] Dr. Tom Fisher, Indian Health Service, telephone interview, August 1998.

Table 4: A Selection of 48 Reservations Listed in the Report

Name of reservation	Percent WITHOUT a telephone in their home
Acoma Pueblo and Trust lands, NM	30.0
Blackfeet Reservation, MT	31.7
Canaraugus Reservation, NY	20.7
Cheyenne River Reservation, SD	47.8
Colorado River Reservation, AZ-CA	33.4
Colville Reservation, WA	27.8
Crow Reservation and Trust Lands, MT	54.9
Devil's Lake Sioux Reservation, ND	57.4
Eastern Cherokee Reservation, NC	36.8
Flathead Reservation, MT	26.7
Fort Apache Reservation, AZ	64.5
Fort Belknap Reservation and Trust Lands, MT	43.1
Fort Berthold Reservation, ND	43.7
Fort Hall Reservation and Trust Lands, ID	30.1
Fort Peck Reservation, MT	38.1
Gila River Reservation, AZ	77.8*
Hoopa Valley Reservation, CA	35.8
Hopi Reservation and Trust Lands, AZ	49.3
Isleta Pueblo, NM	18.5
Jicarilla Apache Reservation, NM	50.6
Lac Courte Oreilles Reservation and Trust Lands, WI	38.0
Laguna Pueblo and Trust Lands, NM	26.0
Lake Traverse (Sisseton) Reservation, ND-SD	50.5
Leech Lake Reservation, MN	31.6
Menominee Reservation, WI	27.9
Mescalero Apache Reservation, NM	58.4
Mississippi Choctaw Reservation and Trust Lands, MS	66.4
Navajo Reservation and Trust Lands, AZ-NM-UT	81.6
Nez Perce Reservation, ID	30.4
Northern Cheyenne Reservation and Trust Lands, MT-SD	61.0
Oneida (West) Reservation, WI	17.3
Osage Reservation, OK	18.2
Papago Reservation, AZ	55.9
Pascua Yaqui Reservation, AZ	26.8
Pine Ridge Reservation and Trust Lands, NE-SD	58.6
Red Lake Reservation, MN	41.0
Rosebud Reservation and Trust Lands, SD	56.2
St. Regis Mohawk Reservation, NY	15.9
Salt River Reservation, AZ	55.1
San Carlos Reservation, AZ	83.9
Standing Rock Reservation, ND-SD	56.8
Turtle Mountain Reservation and Trust Lands, ND-SD	31.8
Uintah and Ouray Reservation, UT	49.1
Warm Springs Reservation and Trust Lands, OR	31.6
White Earth Reservation, MN	35.3
Wind River Reservation, WY	49.3
Yakima Reservation and Trust Lands, WA	24.1
Zuni Pueblo, AZ-NM	32.6
For data on reservations not shown, please contact Robert Bonnette at 301/763-8553.	

*Gila River has since improved this figure dramatically by offering telecommunications services through its own Tribal Telephone Company. See the section on "Native-Owned Businesses and Organizations" for specific details.

REGULATORY LANDSCAPE

The telecommunications, information, and high technology industries have become an important part of daily life in the modern world, virtually touching all aspects of our day-to-day lives. The effects of the availability of the products of these industries, or the total lack thereof, on tribal governments and communities, however, are not entirely understood. In particular, the concept of asserting sovereignty in these fields (i.e., utilities, telecommunications, information services, etc.) has only recently been considered by most tribal governments. In the immediate future, tribes will be forced to address the application of tribal sovereign authority and tribal cultural values to these industries, not only to ensure that tribal members have access to important technologies and services, but also to ensure that these same technologies are not harmful to tribal sovereignty, culture, or existence.

The telecommunications industry is a highly regulated industry. Any given service or service provider may face regulation by federal, state, and local governments. In most cases, there is little dispute over the application of such regulation to a given service. The division of federal, state, and local jurisdiction over telecommunications services is reasonably well established. The appropriate application of existing regulatory schemes in the context of services to and by Indian tribes, however, is far from simple and not well defined. This section will briefly identify some of the more significant issues in tribal telecommunications and discuss possible approaches to the regulation of telecommunications services in Indian Country.

Through the utilization of available and developing technology, and through the combined efforts of tribal nations, corporate America, and the United States (under its continuing trust responsibilities[6]), tribes can promote self-determination, sovereignty, and social and political empowerment well into the next century. Moreover, technology can help to achieve these goals without sacrificing tribal concepts of community, conservation, and environmental harmony.

The provision and regulation of telecommunications services is, however, a complex topic. A full treatment is well beyond the scope of this report. The following discussion, therefore, will provide a framework for further consideration and research in the areas of tribal telecommunications ventures and tribal regulation of telecommunications services. This framework will take into account the application of principles of Federal Indian Law to traditional telecommunications regulatory schemes.

STATE/FEDERAL REGULATION OF TELECOMMUNICATIONS

To gain an understanding of the issues raised by the application of Federal Indian Law to telecommunications regulation, we must first consider the basic state/federal regulatory scheme. This scheme governs the provision of services outside of Indian Country.

Although most people think of the Federal Communications Commission (FCC) when they consider the regulation of telecommunications services, jurisdiction over telecommunications is actually divided between the federal and state governments. The Communications Act of 1934 (the "Act"), as amended by the Telecommunications Act of 1996, expressly displaces state jurisdiction to regulate interstate and international radio or wire communications. The Act makes, however, an equally clear reservation of state authority over intrastate communications.[7] This division raises some interesting and often difficult questions for tribes and tribal businesses, discussed below.

The Federal Communications Commission

The FCC is an "independent agency" of the U.S. government. Independent agencies are created by Congress and are not under the direct control of either the executive or the legislative branches. The FCC is, however, in various ways controlled by all three branches of the government that exercise various oversight, budgetary, and operational controls over its activities. The FCC is directed by five Commissioners appointed by the President and confirmed by the Senate for 5-year terms. One of these Commissioners is then appointed by the President as Chairperson.

The Commission is organized into six operating bureaus and a number of other regulatory offices. The bureaus are: Mass Media, Cable Services, Common Carrier, Compliance and Information, Wireless Telecommunications, and International. These bureaus are responsible for developing and

[6] As a result of the unique relationship between tribes and the United States Government, the United States owes a duty to protect the interests of the various tribes. Established early as a guardian/ward relationship, the Trust Doctrine imposes a fiduciary duty on the United States Government to conduct its authority with respect to Indian tribes in a manner which protects the best interests of those tribes. The United States Supreme Court noted in *United States v. Creek Nation*, 295 U.S. 103 (1935), that "governmental power to manage and control Indian property and affairs is not absolute, but is subject to limitation inherent in a guardianship." *Id.* at 109-10.

[7] Some telecommunications programs, such as the Universal Service Fund, a fund that subsidizes the provision of basic telephone service to high-cost areas, are, however, administered jointly by the state and federal governments.

implementing regulatory programs, processing applications for licenses or other filings, analyzing complaints, conducting investigations, and taking part in FCC hearings. Each bureau is further divided into numerous functional branch and division offices each with a specific regulatory duty.*

The following are brief descriptions of the bureaus and some of the other Commission offices:

Office of Communications Business Opportunities

Although not one of the major bureaus, the Office of Communications Business Opportunities (OCBO) deserves first mention here because it houses the newly appointed "Indian Desk" at the FCC. The Commission recently has begun a process of informing itself as to its duties and obligations to federally recognized Indian tribes under the Federal Trust Doctrine. The Indian Desk represents an important resource for all tribal representatives responsible for telecommunications issues and is a good point of first contact. To reach the Indian Desk, contact Eric Jensen at (202) 418-0928.

The OCBO generally is responsible for providing advice to the Commission on issues and policies concerning opportunities for ownership and contracting by small, minority, and women-owned communication businesses. The OCBO also ensures that small business interests are considered in all FCC notice and comment rulemakings.

Cable Services

The Cable Services Bureau administers the "Cable Television Consumer Protection and Competition Act of 1992." The Bureau ensures that cable rates are reasonable under the law. It is also responsible for regulations concerning "must carry," retransmission consent, customer services, technical standards, home wiring, consumer electronics, equipment compatibility, indecency, leased access, and program access provisions. The Bureau also analyzes trends and developments in the industry to assess the effectiveness of the cable regulations.

Common Carrier

The Common Carrier Bureau regulates wire and radio common carriers (e.g., local and long distance telephone companies). It supervises charges, practices, classifications, and regulations in interstate and foreign communication by radio, wire, and cable. It also is responsible for the licensing of certain wireless telephone systems. The Common Carrier Bureau, thus, is responsible for all regulatory aspects of the operations of common carriers. In addition, it is responsible for implementation and regulation of the Universal Service system.

Compliance and Information

The Compliance and Information Bureau monitors and ensures compliance with telecommunications law and policy, and supports safety applications of radio spectrum. The Bureau also provides the Commission with information needed to develop and implement telecommunications policies. It interacts daily with military, state, and local authorities in policing the airwaves to ensure open access to spectrum by the industry and the public. This Bureau is the FCC's primary resource for identification and resolution of interference problems.

International

The International Bureau is responsible for all FCC international telecommunications and satellite programs and policies. The Bureau represents the Commission and the United States, under the auspices of the U.S. Department of State, in international conferences involving telecommunications matters. Its other functions include international safety and distress, space and earth stations, cable landing licenses, bilateral discussions, and interaction with other international organizations.

Mass Media

The Mass Media Bureau regulates AM, FM, and television broadcast stations and related facilities. It assigns frequencies and call letters to stations, and designates operating power and sign-on and sign-off times. It also regulates existing stations, to ensure that they operate in accordance with rules and technical provisions of their authorizations.

Wireless Telecommunications

The Wireless Telecommunications Bureau regulates radio stations serving the communications needs of businesses, individuals, nonprofit organizations, and state and local governments. This Bureau is responsible for all domestic terrestrial wireless telecommunications programs. The services it regulates include Cellular Services, Personal Communications Services (PCS), Paging, Local Multipoint Distribution Service (LMDS), and Specialized

* The FCC maintains a Web site at http:\\www.fcc.gov. This site contains all of the Commission's orders, public notices, news releases, etc., as well as a number of consumer guides and fact sheets, and is updated daily. The site is an excellent starting place for research into telecommunications issues. In addition, the FCC's rules may be found in Title 47 of the Code of Federal Regulation (CFR) and the Communications Act is codified at Title 47 of the United States Code. Information and consumer assistance can be obtained from the Commission by writing to: The Public Service Division, Federal Communications Commission, 1919 M Street, NW, Room 254, Washington, DC 20554, or by calling 202-418-0200/TTY 202-418-2555.

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Mobile Radio, Air-to-Ground, and Basic Exchange Telecommunications Radio Services (BETRS). The Bureau's Enforcement Division ensures that wireless telecommunications service providers comply with the Communications Act, statutes and Commission rules, orders and policies. The Bureau also conducts spectrum auctions.

Office of the General Counsel

The General Counsel serves as the chief legal advisor to the Commission. The General Counsel also represents the Commission before the federal courts of appeals and recommends decisions in adjudicatory matters before the Commission.

Office of Engineering and Technology

The Office of Engineering and Technology (OET) is the FCC's technical adviser on engineering and scientific matters. It is responsible for managing the nongovernment use of the radio spectrum, making recommendations on how the radio spectrum should be used and establishing technical standards for radio services.

State Regulatory Agencies

The state regulatory agencies responsible for telecommunications are generally the state public utilities or service commissions (PUCs or PSCs) or the state corporation commissions. These agencies are responsible for the regulation of intrastate telecommunications services and the terms and conditions of some federally regulated telecommunications services (e.g., cellular services terms and conditions). The primary tasks of the state agencies are the certification of telephone service providers within the state, the promulgation of consumer protection laws, and the regulation of rates charged. Each state establishes its own governing statutes, regulations, and policies. Each of the state regulatory bodies also varies in structure, procedures, and authority.

CYBERSOVEREIGNTY AND OPPORTUNITIES FOR TRIBES

As is typically the case in matters involving Indian tribes, the application of the principles of federal Indian law to the traditional telecommunications regulatory structure is not easy. The extent to which federal and state regulatory authority over telecommunications services in Indian Country exists has never been universally defined. In most cases, for example, because the tribes have not exercised their authority to regulate telecommunications services within reservation boundaries, the state regulatory agencies have exercised jurisdiction over telecommunications services within Indian Country by default. On the other hand, some states, such as California and Arizona, recognize their lack of jurisdiction over Indian-owned and operated telecommunications companies providing service on Indian reservations.

TRIBAL OPPORTUNITIES

Perhaps the key questions are: what role will tribes play in the opportunities provided by the information age, and what will be the impact of state and federal regulations on those opportunities? Three basic areas of tribal participation are readily apparent: community and cultural development, economic development, and political empowerment.

Community and cultural development is perhaps the development area most commonly considered for tribal communications. Many projects within Indian Country fit under this label. Noncommercial radio and television stations have been part of the tribal landscape for years, and have as their main purpose the provision of culturally appropriate services to Indian communities. Other examples include Internet education and access projects, satellite services, and public safety radio networks. To the extent that any of these services have been regulated, such regulation has, by and large, been left to state and federal governments.

Pure economic development through telecommunications opportunities is a less common phenomenon in Indian Country. While a number of tribal nations have developed their own tribal telephone companies, until recently these ventures were driven primarily by the desire to provide much needed services to tribal members and businesses. With recent and continuing significant developments in the multi-billion-dollar telecommunications industry, there are many potential economic development opportunities for tribal nations. These opportunities include:

commercial television and radio station ownership, wireless services, local telephone operations, and cable services, to name a few. Tribes could invest in such ventures whether the ventures were located on or off the reservation. A tribe located in a highly rural area, for example, could invest in a commercial broadcast venture in New York City, the most lucrative broadcast market in the nation. Although such a venture would not bring services directly to tribal members, it would provide significant investment income that could then support other tribal plans and services.

The political development possibilities provided by telecommunications technology stem from the old adage, "knowledge is power." Information is the currency of the information society. The greater and better access that tribes have to information through advanced telecommunications technologies, the more effectively they will be able to control their own destinies and respond to potential political threats and opportunities. Moreover, telecommunications technologies can be used to reestablish links with tribal members no longer living in Indian Country. These links would serve to strengthen the social and cultural fabric of Indian communities and provide for expanded human resources.

The following represent some of the issues and opportunities that tribes should examine:

Economic Empowerment

The creation of tribal information economies could greatly improve the economic situation of many tribes and their members. Information technology as a means of economic empowerment is essential to the future growth and strengthening of tribal life. Correctly applied, however, information technologies will bring significant advances to tribal financial, economic, social, political, health, education, and general welfare.

Tribal information parks, for example, represent a means to generate significant economic empowerment in Indian Country. Virtual workforce development through the use of information technology and informatics presents opportunities for tribes to provide high-quality, technology labor workforces at much lower costs than are available in metro urban areas. The development, if necessary, of an information infrastructure will create information empowerment zones. These zones should be included in the definition of economic empowerment zones for given tribal communities, and appropriate federal resources should be made available to support their long-term development.

With sufficient technology infrastructure, tribes could take advantage of many of the economic realities of rural life to become competitive in any

number of technology industries. The cost of land for housing, for example, is much lower on reservations, which reduces the overall cost of labor. Independent professional workers working from reservations via affordable access to high-speed advanced networking services, such as desktop videoconferencing, Internet access, and advanced digital telephone services, would be an attractive independent workforce for the tribe and outside companies.

Health Care

Telemedicine and telehealth services could become the backbone of health services to Tribal Nations. With the proper infrastructure, they could augment existing health care delivery systems to directly improve the quality of health care. The economies of cost of health care could be improved tremendously through technological enhancements to current programs. For example, the coordination of home health care through wireless communications; wireless Internet access; slow-scan wireless video; and integrated seamless wireless technologies all could provide higher quality services to Indian communities and enhance patient access to health care providers.

Other potential advances include using wireless technologies for remote cardiac care monitoring, elder medical alert systems, and increased and improved home health care delivery through upgraded providers; as well as increased and enhanced 911 services and emergency response services using video and audio communications to provide patient care and stabilization while in emergency transport. In addition, providers could use digital radio communication and wireless Internet tools to access supervisors, physicians, and health care databases to ensure optimum care to home shut-in patients.

Law Enforcement and Social Services

Advanced information technologies and services offer significant opportunities to improve law enforcement, public safety, and social services to tribes and tribal residents. Law enforcement, for example, would benefit from improved information coordination and tracking and monitoring capabilities. In addition, emergency response times could be improved by advanced telecommunications technologies.

Welfare reform programs could be supported through network coordination of information and referrals systems found on-line. Workers could seek training and education to conform to a more advanced workplace and other digitally driven employment opportunities, including home employment through contract arrangement with prospective employers. Providers could coordinate and meet regularly through videoconferencing and communicate via the Internet without constraints on time or location. A better service-oriented outcome and coordinated delivery system would dramatically affect the outcomes of welfare reform initiatives on the Indian reservations.

Emergency paging systems would assist in victim protection, and technology solutions in general could ensure better response time by victims' advocacy groups and by law enforcement. Tribal law enforcement personnel would be able to provide better coverage and services with fewer human resources, utilizing advanced technologies and information infrastructures.

Education and Cultural Self-Determination

Many of the tribes around the country already have begun to implement Internet access for education in tribal and BIA schools. The role of education is critical to the future of tribal development and community response to conditions and issues. Tribes without tribal colleges or tribally run K-12 schools can consider augmenting education through after-school tribal technology learning centers to ensure that students who are tribal members are not handicapped in public schools.

The archiving and sharing of cultural resources, and the development of appropriate policies for care and protection of the resources, are also necessary. Museums across the country are building comprehensive databases to provide graphical presentations of collections and exhibitions. Tribes must work to protect sacred objects and ensure that privacy and security are maintained in appropriate instances involving cultural patrimony. Intellectual property is yet another key area for which tribes need to build appropriate responses and policy regarding cultural property.

Tribal Community Networking and Locally Determined Strategies

The use of information technology and emergent advanced digital technologies for local community purposes presents significant possibilities for rural and other communities. Interaction and information-sharing among tribal communities would help to develop well-informed tribal communities. Such communities are better able to respond to new issues and challenges and to assist tribal leadership in developing clear strategies for community programs. A well-informed community will make sound decisions and, thus enhanced, locally determined strategies

will drive community processes to a higher level than ever before.

Key to the opportunities discussed above is a solid, advanced telecommunications infrastructure. The following is a list of potential opportunities for tribal governments and members to help develop such infrastructure while, at the same time, providing economic development opportunities. This list is by no means exhaustive, but rather should provide a starting point for thinking about potential tribal ventures. Tribal governments and communities could provide:

- Local telephone services to tribal members via wireline or wireless systems (or both). Service could be expanded to off-reservation residential and business subscribers.
- Long distance telephone service, both nationally and internationally.
- Video services, including cable television, video-on-demand, direct broadcast satellite service, and wireless cable. In addition to standard programming, a tribe or tribal group could actually develop a network and provide Indian programming nationally/internationally.
- Data services and Internet access. Such services could be provided to both tribal members and off-reservation subscribers.
- Distance learning and telemedicine services.

Each of the above services could be provided using a number of different business models. For example, a local telephone venture could be wholly owned by the tribe, part of a joint venture with a non-Indian company, or simply contracted for by the tribal government. Although a complete analysis of the many business model considerations and issues that a tribe must consider is beyond the scope of this discussion, they are vitally important to any tribal venture or program and must be addressed early in the planning process.

TRIBES AS REGULATORS

After considering the issues and opportunities carefully, many tribes may choose, for any number of valid reasons, not to enter into the telecommunications arena. The analysis of these issues, however, does not end with that decision. Each tribe must also carefully consider its role as the regulatory authority with respect to services offered on lands under its control.

This role could manifest itself in a number of ways. The tribe might, for example, establish rate regulations to ensure affordable rates, or implement minimum service benchmarks for services within Indian Country. The tribe would also be responsible for establishing and enforcing taxation of telecommunications services, land use restrictions, consumer protection requirements, and so on. In addition, the tribe will be the entity most capable of monitoring and influencing federal telecommunications policy that may affect its members. For example, absent tribal input and consultation, the FCC may not adequately account for tribal needs and concerns when implementing the federal Universal Service Program. Because the program is crucial to the development and maintenance of affordable telecommunications infrastructure and services in high-cost areas, including reservations, it is critical that tribal governments participate in the implementation process.

As sovereign entities, tribes exercise civil regulatory authority over lands under their jurisdiction and activities taking place thereon.[9] Recognizing that the availability of advanced telecommunications services could offer many significant economic and social benefits for its members, each tribe must evaluate its role and its obligations with respect to such availability. The obligations that a sovereign nation has to its members likely will require that the tribe act to ensure the availability and affordability of advanced, and in many cases basic, telecommunications services.

TRIBAL SOVEREIGNTY/JURISDICTION

What are a tribe's sovereign rights in this field? The answer to this question is not entirely settled. Indeed, the question has barely even been asked. However, certain points seem clear and provide guidance in this area.

Any discussion of sovereignty should begin with the classical definition of the term, not the version that has been applied to federal-Indian relations. A traditional definition of sovereignty is: "The supreme, absolute, and uncontrollable power by which any independent state is governed."[10] Chief Justice John Marshall acknowledged the absolute nature of sovereignty in *The Schooner Exchange v. M'Faddon*, 11 U.S. (7 Cranch.) 116 (1812) (involving the peacetime jurisdiction of United States courts over a French warship). Marshall

[9] A comprehensive 1934 Opinion of the Solicitor of the Department of the Interior concluded that "over all the lands of the reservation, whether owned by the tribe, by members thereof, or by outsiders, the tribe has the sovereign power of determining the conditions upon which persons shall be permitted to enter its domain, to reside therein, and *to do business*." 55 Interior Dec. 14, 50 (1934)(emphasis added). *See also Montana v. United States*, 450 U.S. 544 (1981).

[10] BLACK'S LAW DICTIONARY 1396 (6ED. 1990).

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stated that "[t]he jurisdiction of the nation within its own territory is necessarily exclusive and absolute. It is susceptible of no limitation not imposed by itself."[11] From this point of view, the tribe may do as it pleases with respect to telecommunications services, free from intervention by the states or the federal government.

Federal Indian Law, however, adds its own twist to the traditional definition of sovereignty. The *Handbook of Federal Indian Law* lists three "fundamental principles" that demonstrate the anomalous and restricted nature of tribal sovereignty: 1) Indian tribes possess all the powers of a sovereign state; 2) conquest rendered the tribes to the legislative authority of the United States and terminated the tribes' external sovereign powers, but did *not* affect the internal sovereign power of the tribes; and 3) these powers are subject to qualification by treaties and congressional legislation.[12] Under this regime, it appears that the tribes would at least be subject to federal legislation if directed at the area of telecommunications and if it was intended to include the tribes.

This approach to tribal sovereignty raises the question of whether the Act, as amended, applies within Indian Country. To date, the Act has largely been applied to services within Indian Country because the tribes have not stepped forward to assert their authority. Thus, the situation is largely untested. The FCC has never seriously considered its regulatory authority within Indian Country, nor has that authority ever been seriously challenged.

It is generally, although not universally, held that statutes written to apply to all Americans apply within Indian Country.[13] Even if a court were to decide that this were not the case, however, Congress likely would act quickly to include Indians within the scope of the telecommunications legislation. Even if the FCC has jurisdiction, its actions must be consistent with the precepts of tribal sovereignty. A tribe's sovereignty cannot be diminished by Commission regulations.[14]

As noted above, the authority of states to regulate tribal telecommunications matters is less clear, given the existence of disputes over the issue. In general, however, state regulation does not apply on tribal land or against tribal activities.[15] Arguments will be made, however, that the states have a great interest in regulating tribal telecommunications and that the tribes have waived and/or acquiesced to state regulation. Tribes may prevail with respect to reservation activities, but will almost certainly be subject to state regulation for off-reservation activities. Much will depend upon how the tribes approach their ventures and their own telecommunications policies and laws.

The United States Supreme Court, in *Montana v. United States*,[16] stated that a tribe retains "inherent power to exercise civil authority over the conduct of non-Indians on fee lands within its reservation when that conduct threatens or has some direct effect on the political integrity, the economic security, or the health or welfare of the tribe."[17] Because the availability of basic and advanced telecommunications services is vital to the health and welfare of a tribe and its members, tribal civil authority over telecommunications matters must be recognized under *Montana*.

Because the tribe has jurisdiction with respect to activities on tribal lands, any regulatory actions of a tribe are entitled to recognition by state and federal governments.[18] As President Clinton stated in an executive memorandum outlining the principles to be followed by all executive departments and agencies with respect to Indian tribes:

> The United States Government has a unique legal relationship with Native American tribal governments as set forth in the Constitution of

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[11] *Id.* at 136.

[12] FELIX S. COHEN, HANDBOOK OF FEDERAL INDIAN LAW 241-42 (1982).

[13] *See Id.* at 282-286.

[14] *See e.g. Pyramid Lake Paiute*, 354 F. Supp. at 256-57.

[15] Courts, federal agencies, and state regulatory agencies have upheld tribal civil authority in numerous contexts, including taxation. *See e.g., Washington v. Confederated Tribe of Colville Indian Reservation*, 447 U.S. 134 (1980), zoning, *see e.g., Knight v. Shoshone and Arapahoe Indian Tribes, etc.*, 670 F.2d 900 (1982), environmental protection, *see Amendments to the Water Quality Standards Regulation That Pertain to Standards on Indian Reservations*, 56 Fed. Reg. 64876 (1991), and the regulation of electrical utilities, see e.g. Letter from the California Public Utilities Commission dated July 14, 1992; Petition of Fort Mojave Indian Tribe for an Advisory Opinion as to Whether its Aha Macav Power Service is Jurisdictional to the Public Service Commission of Nevada, Docket No. 92-8003 (Oct. 26, 1992).

[16] 450 U.S. 544 (1981).

[17] *Id.* at 565-66.

[18] *See, e.g., Wisconsin Potowatomies of Hannahville Indian Community v. Houston*, 393 F. Supp. 719 (W.D. Mich. 1973); Jones v. Meehan, 175 U.S. 1, 28-32 (1899).

> the United States, treaties, statutes, and court decisions. As executive departments and agencies undertake activities affecting Native American tribal rights or trust resources, such activities should be implemented in a knowledgeable, sensitive manner respectful of tribal sovereignty.[19]

In keeping with the President's statement, the FCC recently has begun the important process of developing an internal and external government-to-government relationship policy to govern its activities relating to or affecting Indian Country. One important aspect of such a policy is the consideration that even if the Act were finally determined to apply in Indian Country, that determination would not necessarily require that all Commission rules and policies apply equally. The government-to-government policy could be written to recognize concurrent federal/tribal authority. With such a policy in place, tribes could operate in accord with FCC technical requirements (so as to avoid interference problems), but could maintain greater control over other aspects of telecommunications regulation. Thus, for example, a tribe could inform the FCC that it would be building a radio station on the reservation and that all necessary technical considerations had been resolved. It might then proceed with construction without FCC "authorization." Such a concurrent jurisdictional arrangement could go a long way in satisfying the needs of all concerned.

In the coming months, the FCC will be working to address this and other important issues. In addition, it plans to begin a number of proceedings aimed at addressing the severe lack of telephone service in Indian Country and other underserved areas. Tribes must position themselves to participate in these proceedings to help the FCC better understand its role with respect to tribal telecommunications issues.

NEXT STEPS

Despite the current efforts by the FCC, when Indians are considered in the context of telecommunications issues, they are merely seen as an underserved minority by the policy makers and an untapped market by corporations. Any policy that recognizes tribal sovereignty must be a product of tribal efforts. Tribes must begin to take a number of important steps to reach this goal.

As an initial matter, tribal governments must begin to educate themselves about these very complex issues. Each tribe must put itself in a position to make an educated decision regarding its role in the provision of telecommunications services on land under its jurisdiction. At the same time, tribal governments should also conduct needs analyses within their communities to determine the exact nature of the need for advanced telecommunications services. Once these needs are identified, they can be prioritized and a plan can be formed to meet them.

In addition to the necessary education process that the tribes must undergo, the FCC also must be educated with respect to tribal telecommunications issues. Tribes should participate as much as possible in the proceedings and other outreach activities at the FCC. A proactive approach now could avoid years of catch-up and defensive reaction to FCC policies and decisions that do not measure up to tribal expectations.

Telecommunications technologies offer tremendous opportunities for tribes and Indian people. To take advantage of these opportunities, tribes must prepare a well-structured plan of attack. Telecommunications issues and disputes can be very controversial and usually are hard fought by the parties concerned. With a thorough understanding of tribal needs and the issues raised by telecommunications services in Indian Country, however, tribes will be better prepared to assess the opportunities available in the telecommunications industry. This discussion can provide a conceptual outline, but much more work will need to be done.

[19] Government-to-Government Relations With Native American Tribal Governments, Memorandum for the Heads of Executive Departments and Agencies, 50 Fed. Reg. 22951 (1994).

III. INFORMATION RESOURCES AND TOOLS

FUNDING AND ASSISTANCE

This chapter lists current sources of funding and assistance for telecommunications and technology projects, divided into three main areas:

- federal funding and assistance sources
- private funding sources
- corporate foundations

Over the past few years, federal funding and assistance programs have increased dramatically. This is due in large part to the administration's efforts to integrate telecommunications and information technology into U.S. schools, libraries, and businesses. This section will provide a detailed list of both Native American-focused programs and federal programs that include telecommunications and information technology in their scope of funding.

Private and corporate funding programs have also grown, both in scope and funding levels, for telecommunications and technology. Today, up to 400 private and corporate foundations provide grants in these areas. This section will list only a selection of these programs. However, a directory of the 400 foundations, as well as other resources, is provided at the end of this chapter.

All information in this chapter has been obtained directly from the Internet, unless otherwise cited.

FEDERAL GOVERNMENT FUNDING AND ASSISTANCE PROGRAMS

Information in this section is organized alphabetically by agency.

Please note that each agency offers a variety of programs. Information about telecommunications and information technology funding is often included under larger funding categories such as education, telemedicine and health, economic development, or government services.

Program funding levels and deadlines are not provided. For detailed information, please call the contact directly or access the Web site listed.

ENVIRONMENTAL PROTECTION AGENCY (EPA)
www.epa.gov

Small Grants Program
Office of Environmental Justice (OEJ) Programs
Environmental Protection Agency
401 M Street, SW
Washington, DC 20460
Tel: 800-962-6215 (24-hour Hotline)
es.epa.gov/oeca/oej/98grants.html

The OEJ Small Grants Program was established in 1994 to assist community-based organizations (i.e., grassroots groups, churches, or other nonprofit organizations) and federally recognized tribal governments to sponsor and/or plan to carry out projects to address local environmental justice issues. These projects can include a telecommunications and/or technology element.

State and Tribal Environmental Justice (STEJ) Grants Program
Daniel Gogal, STEJ Grants Manager
Office of Environmental Justice
Tel: 202-564-2576 or 1-800-962-6215
gogal.danny@epamail.epa.gov
es.epa.gov/oeca/oej/98grants.html

The STEJ Grants Program was created to provide financial assistance to state and tribal environmental departments that are working to address a number of environmental justice objectives and goals, which include: enhancing the state or tribal government's effectiveness in complying with Title VI of the Civil Rights Act of 1964; providing financial and technical resources to develop an enabling infrastructure at the state/local community level and tribal/community level; and setting up model programs to address enforcement and compliance issues in affected environmental justice (EJ) communities.

FEDERAL COMMUNICATIONS COMMISSION (FCC)
www.fcc.gov

Indian Desk
Eric Jensen
Deputy Director, Office of Communications Business Opportunities
Federal Communications Commission
1919 M Street, NW, Suite 644
Washington, DC 20554
Tel: 202-418-0928
Fax: 202-418-0235
ejensen@fcc.gov

The Indian Desk was recently created to address the specific needs and issues that tribes have regarding telecommunications policy developed at the FCC. The Indian Desk represents an important resource for all tribal representatives responsible for telecommunications issues and is a good point of first contact.

Universal Service Fund:

- Universal Service Administrative Company (USAC)
- Schools and Libraries Corporation (SLC)
- Rural Health Care Corporation (RHCC)

The Universal Service Fund was created from a mandate of the Telecommunications Act of 1996 to ensure that all Americans have access to affordable and qualitative telecommunications services.

On May 8, 1997, the FCC complied with this mandate by enacting the Universal Service Order. This Order created a number of policies aimed at ensuring affordable service to all Americans, specifically low-income consumers and those who live in rural, insular, and high-cost areas. The Order also established two new funds: one to provide telecommunications services discounts to schools and libraries, and another to lower the prices paid by rural health care providers for telecommunications services.

Universal Service Administrative Company (USAC)
National Exchange Carrier Association (NECA)
1201 Pennsylvania Avenue, NW, Suite 300
Washington, DC 20004
Tel: 800-438-7206
Fax: 202-663-9065
www.neca.org/usac.htm

In 1997, the FCC appointed NECA as the temporary administrator of the support mechanisms that will fund the universal service programs created by the Universal Service Order. The FCC ordered NECA to incorporate an independent, nonprofit subsidiary, the Universal Service Administrative Company (USAC), and two nonprofit, unaffiliated corporations, the Schools and Libraries Corporation (SLC) and the Rural Health Care Corporation (RHCC).

Currently, USAC has temporary administration over:

- universal service support mechanisms for high-cost areas and low-income consumers, and
- billing, collection, and disbursement functions for schools, libraries, and rural health care providers.

The SLC and RHCC provide all other functions, such as administering the application process, creating and maintaining a Web site to post service applications, and performing outreach and public education functions needed to administer the schools, libraries, and rural health care programs. Further information about these programs is provided below.

Lifeline Assistance and Link-Up America Programs

USAC also administers the federal programs designed to provide low-income consumers with assistance in obtaining and maintaining telephone service:

- Lifeline Assistance waives or reduces monthly subscriber line charges.
- Link-up America assists customers in defraying telephone connection charges.

These programs are also funded by all telecommunications service providers. Both programs were expanded as a result of the May 1997 Universal Service Order and are governed by Part 36 and Part 54 of the "fccrules.htm" FCC's Rules.

FUNDING PROGRAMS:

Schools and Libraries Corporation (SLC)
P.O. Box 4217
Iowa City, IA 52244-4217
Client Service Bureau:
Toll-free Help Line: 888-203-8100
Fax: 888-276-8736
Fax-On-Demand: 800-959-0733 (to request SLC documents)
question@slcfund.org (schools and libraries only)
serviceprovider@slcfund.org (service providers only)
www.slcfund.org

The Schools and Libraries Universal Service Program was established as part of the Telecommunications Act of 1996 with the express purpose of providing affordable access to telecommunications services for all eligible schools and libraries, particularly those in rural and inner city areas. Funded at up to $2.25 billion annually, the Program will provide discounts of 20 percent to 90 percent on telecommunications services, Internet access, and internal connections.

Rural Health Care Corporation (RHCC)
PriceWaterhouseCoopers LLP
Attn: RHCC
1616 North Fort Myer Drive
Arlington, VA 22209-3195
Customer Service Support Center Help Line:
800-229-5476
rhcc_info@rhccfund.org
www.rhccfund.org

The RHCC was formed to ensure that rural Americans obtain the benefits of current telecommunications technology as provided for by the United States Congress, the President of the United States, and the Federal Communications

BEST COPY AVAILABLE

Commission, through Universal Service support. The Universal Service Support Program established a fund of up to $400 million annually so that rural healthcare providers pay no more than their urban counterparts pay for telecommunication services.

GENERAL SERVICES ADMINISTRATION

www.gsa.gov

Office of Information Security (OIS)

Cecil Dyer
Deputy Director, OIS-TIR
7th & D Streets, SW
Room 5060
Washington, DC 20407
Tel: 202-708-6637
Fax: 202-708-6646
technology.4tribes@gsa.gov or cecil.dyer@gsa.gov

The OIS is an award-winning federal organization that provides worldwide information security and technology services to other federal agencies on a fee-for-service basis. OIS offers single point-of-contact convenience and worldwide services by "in-place" technical specialists located throughout the United States, Europe, and the Far East.

The OIS is working with government and industry to plan and implement the security infrastructure supporting government applications such as electronic commerce, electronic messaging, and initiatives undertaken as a result of the emerging information-based technologies.

OIS's professional staff provides expertise in areas such as firewall technology, intrusion detection/incident response, network security, cryptology, risk management, information security planning, systems engineering, project management, system installation and restoration, and procurement.

The OIS strongly supports the goal of developing economic independence for Indian Country, and is aggressively seeking situations that will allow it to partner with tribally owned companies and enterprises. For more information, call Cecil Dyer at the number above.

INSTITUTE OF MUSEUM AND LIBRARY SERVICES (IMLS)

www.imls.fed.us

1100 Pennsylvania Ave., NW
Washington, DC 20506
Tel: 202-606-8536 (Office of the Director)
202-606-8539 (Office of Museum Services)
202-606-5227 (Office of Library Services)

The IMLS is a federal agency that strengthens museums and libraries to benefit the public. In 1997, the Institute of Museum Services began administering library programs that were previously a part of the Department of Education. The new agency, the Institute of Museum and Library Services, awarded its first library grants in 1998.

FUNDING PROGRAMS:

Native American Library Services

Native Hawaiian Library Services

Contact: Teresa Brown, Program Officer
Tel: 202-606-5408
tbrown@imls.fed.us

The Native American Library Services grants provide small grants for core library operations of tribes and Alaska Native villages; technical assistance for these libraries; and enhancement grants to promote innovative practices in libraries serving Native Americans and Alaskan Native villages.

The Native Hawaiian Library Services grant provides a single grant to an organization that primarily serves and represents Native Hawaiians.

Both grants have been issued to libraries for projects involving the use of multimedia technologies and computer training.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

www.nasa.gov

NASA Education Programs
Frank C. Owens, Director
Education Division
NASA Headquarters
Washington, DC 20546-0001
Tel: 202-358-1110

Learning Technologies Project (LTP)

Thomas J. Dyson
Ames Research Center, M/S 269-4
Moffett Field, CA 94035-1000
Tel: 415-604-6601
Fax: 415-604-4036
tdyson@mail.arc.nasa.gov //learn.ivv.nasa.gov
http://quest.arc.nasa.gov Quest - K-12 Internet Initiative (educator/student support)
http://observe.ivv.nasa.gov The Observatorium - Public access to earth and space science

LTP captures the educational potential of NASA programs and conducts and facilitates educational projects at all levels of the American educational system. LTP is a multicenter activity managed by the HPCC LT Project Office at the NASA Ames Research Center in Mountain View, CA. LTP funds activities that use the National Information Infrastructure (the Internet) and other technologies to foster reform and restructuring in math, science, computing, engineering, and technical education.

LTP's goal is to enhance the knowledge, skills, and abilities of educators and students in science, math, technology, and engineering. (*This program does not provide financial support.*)

FUNDING PROGRAMS:

Educational Technology Program

The goal of this program is to research and develop products and services that facilitate the application of technology to enhance the educational process for formal education and lifelong learning. The objectives include the production of technology teaching tools (CD ROMs, video, software, etc.); development of emerging technologies (or application of existing technology) to education programs; utilization of technology as a means of communication between educators, federal agencies and communities; training and support regarding the integration of technology into education; and support for research into new teaching and learning practices made possible through technology.

Mobile Teacher Resource Center (MTRC)

Dr. Julia Elam
NAFEO Services, Inc.
5214 Baltimore Ave., Suite 200
Hyattsville, MD 20781
Phone: 301-779-7100
Fax: 301-779-9812
jelam@stwnet.com

The MTRC is a self-contained NASA resource facility designed to support teacher enhancement workshops in locations that are often remotely located from NASA facilities. The MTRC consists of an 18-wheel tractor trailer that serves as a model resource center, carrying educational materials and information to elementary and secondary teachers across the nation.

The MTRC program operates from September to May, with equipment modifications and upgrades installed during the summer months. The MTRC workshop plan emphasizes demonstrations of effective models and teaching methods that teachers can use in the classroom. (*This program does not provide financial support.*)

Minority University Research and Education Division (MURED)

Director: Bettie L. White
Tel: 202-358-0970
Fax: 202-358-3745
www.hq.nasa.gov/office/codee/mured.html

NASA's Office of Equal Opportunity Programs (Code E) established MURED in 1990 to increase the agency's responsiveness to federal mandates related to Historically Black Colleges and Universities and Other Minority Universities including Hispanic Serving Institutions and Tribal Colleges and Universities. MURED is responsible for formulating and executing the agency's Minority University Research and Education Program (MUREP) budget, and for developing agency-wide policies, procedures, and guidelines that enhance the involvement of HBCUs and OMUs in the agency's mission.

Minority University-Space Interdisciplinary Network (MU-SPIN)

James Harrington Jr., Project Manager
Goddard Space Flight Center, Code 933
Greenbelt, MD 20771
Tel: 301-286-4063
Fax: 301-286-1775
james.harrington@gsfc.nasa.gov
www.muspin.gsfc.nasa.gov
Dr. Phil Sakimoto, Manager of Indian Programs
NASA Headquarters
Washington, DC 20546-0001
Tel: 202-358-0949
Fax: 202-358-3745
phil.sakimoto@hq.nasa.gov

MU-SPIN is NASA's comprehensive educational initiative for Historically Black Colleges and Universities and Other Minority Universities—including Tribal Colleges. The program focuses on the transfer of advanced computer networking technologies to HBCUs and OMUs and their use to support multidisciplinary research.

The MU-SPIN Program offers many valuable and needed services to the university community. These include hands-on training to faculty and students in accessing resources available over the Internet; hands-on training to technical staff in local area and campus network installation, management and user support; technical sessions at annual conferences; and technical video lectures on network-related issues.

MU-SPIN is very interested in working with Tribal Colleges and would welcome any contact from them regarding their needs in this area. Contact James Harrington at the number above for more details.

NATIONAL ENDOWMENT FOR THE HUMANITIES (NEH) www.neh.gov

1100 Pennsylvania Ave., NW
Washington, DC 20506
Tel: 1800-NEH-1121 or 202-606-8400

Division of Research and Education
Tel: 202-606-8380
research@neh.gov

Division of Public Programs
Tel: 202-606-8267
Publicpgms@neh.gov

FUNDING PROGRAMS:

Division of Research and Education

- Education Development and Demonstration Grants
- Teaching With Technology Grants
- Humanities Focus Grants

Education Development and Demonstration Grants, including "next semester" Humanities Focus Grants, support curriculum and materials development efforts; faculty study programs within and among

educational institutions; and conferences and networks of institutions. Through the Teaching with Technology Grants, the Endowment looks to fund projects that help teachers use new electronic technologies to enhance students' understanding of humanities subjects.

Division of Public Programs

This division fosters public understanding and appreciation of the humanities by supporting projects that bring significant insights of these disciplines to general audiences of all ages through interpretive exhibitions, radio and television programs, lectures, symposia, multimedia projects, printed materials, and reading and discussion groups.

Grants support the planning and production of television and radio programs in the humanities intended for general audiences; the planning and implementation of exhibitions, the interpretation of historic sites, and the production of related publications, multimedia components, and educational programs; and the planning and implementation of projects through the use of books, new technologies, and other resources in the collections of libraries and archives in formats such as reading and discussion programs, lectures, symposia, and interpretive exhibitions of books, manuscripts, and other library resources.

NATIONAL INSTITUTES OF HEALTH (NIH)
www.nih.gov

National Institute of Mental Health (NIMH), Office of Rural Mental Health Research (ORMHR)
Armand Checker
Office of Mental Health Social Science Analyst
NIMH, Room 10-104
5600 Fishers Lane, Rockville MD 20857
Tel: 301-443-9001
Fax: 301-443-4045
NIMH automated fax retrieval system:
301/443-5158 (request Item No. 910052)
achecker@nih.gov
www.nimh.nih.gov

ORMHR supports research grants to study the mental health problems and risks associated with rural life; ways that the incidence and prevalence of mental disorders can be assessed and lowered; and ways that service delivery can be made more accessible and delivered more economically in rural areas by using telecommunications. For example, ORMHR funds telepsychiatry research grants to stimulate research and demonstration projects in the uses of telecommunications for delivery of mental health services in rural areas. ORMHR funds nonprofit and for-profit organizations.

National Library of Medicine (NLM)
Tel: 301-402-4100
www.nlm.nih.gov
Office of High Performance Computing and Communications (OHPCC)
Lister Hill National Center for Biomedical Communications (LHNCBC)
Bethesda, MD 20894

Division of Extramural Programs
Bethesda, MD 20894
Tel: 301-496-4221
Fax: 301-402-0421
epmail@occshost.nlm.nih.gov

NLM FUNDING PROGRAMS:

Internet Connections Grant Program
Frances E. Johnson
Tel: 301-496-4221
fjohnson@nlm.nih.gov

Grants are provided to support Internet connections. Federal dollars can be used to cover gateway and associated connection hardware; internal access equipment, such as personal computers and local area network costs, are expected to be provided by the institution(s). Under this grant program, NLM funds domestic, public and private, nonprofit institutions engaged in health sciences administration, education, research, and/or clinical care, and consortia of health-related institutions.

Information Access Grant Program (Information Access Grants for Health Science Libraries and Institutions)

The Extramural Program Division of the NLM primarily funds small and medium-sized health institutions such as community hospitals which have a need for short-term assistance to achieve better access to and delivery of health science information services through up-to-date computer and telecommunications technologies. On-line access to NLM databases, provision for providing documents, and user training should be elements of the project. Funds either single institutions or a consortia of institutions.

Information Systems Grant Program

Information Systems Grants are distinguished from Access Grants by the scope and nature of the technological means used—i.e., this grant program primarily funds academic health science institutions and larger hospitals. (The organizational unit within the institution which is directly responsible for the project's conduct may be the library or other information service/research-related department.) In order to facilitate the utilization of health science information, funds can be used to establish connectivity of system components (e.g., integrating the medical library into an existing network) and to support improvements to the infrastructure. Applicants are encouraged to incorporate on-line access to NLM databases and some provision for document delivery into their projects.

IAIMS (Integrated Advanced Information Management Systems)

This grant program from the Extramural Program Division supports the planning and operation of Integrated Advanced Information Management Systems (IAIMS) in medical centers and health science institutions and organizations. IAIMS are institution-wide computer networks that link and relate library systems with a variety of individual and institutional databases and information files within and external to the institutions for patient care, research, education, and administration.

HPCC Program (High Performance Computing and Communications)

Health Applications for the National Information Infrastructure
Mary V. Adamik, Contracting Officer
Tel: 301-496-6546
Mary_adamik@nih.gov
or
Michael Ackerman, Chief
Office of High Performance Computers and Communication
Tel: 301-402-4100
Ackerman@nlm.nih.gov

This HPCC program supports projects that develop and demonstrate the use of the Internet in health care, clinical research, and public health. Examples of projects supported include: testbed networks for linking hospitals, clinics, doctors' offices, health professional schools, health sciences libraries, universities, and/or public health authorities to provide two or more of the following applications:

- telemedicine or collaborative technology to allow multiple health care providers to treat patients remotely;
- creation, transfer, and use of electronic health data;
- decision support and information services for patients, caregivers, researchers, and/or public health professionals;
- collection and management of data for multisite clinical research projects; and
- transfer of information between the health care and public health systems.

Biomedical Applications for the Next Generation Internet (NGI)

Mary V. Adamik, Contracting Officer
Tel: 301-496-6546
mary_adamik@nih.gov

This HPCC program supports projects that demonstrate the use of the NGI capabilities in health care, public health and health education, and biomedical, clinical, and health services research. This program supports test-bed networks linking hospitals, clinical practitioners' offices, health professions schools, health sciences libraries, universities, and/or public health authorities to demonstrate revolutionary applications in health care, health education, and medical research. These links must be dependent upon at least two of the following technical capabilities being developed for the NGI—quality of service, medical data privacy and security, nomadic computing, network management and infrastructure technology as a means for scientific management, and infrastructure technology as a means for scientific collaboration.

NATIONAL SCIENCE FOUNDATION (NSF)
www.nsf.gov

NSF FUNDING PROGRAMS:

Crosscutting Programs

- **Knowledge and Distributed Intelligence**
- **Learning and Intelligent Systems**

Division of Research, Evaluation, and Communication
National Science Foundation
4201 Wilson Boulevard, Room 855
Arlington, VA 22230
Tel: 703-306-1650
www.ehr.nsf.gov (see "Crosscutting Programs")

For detailed information, consult the following program announcements: Learning and Intelligent Systems Initiative (NSF 97-18), and Knowledge and Distributed Intelligence (in progress).

Knowledge and Distributed Intelligence

NSF is investing in fundamental research and education designed to realize the full potential of the age of information. Taking shape within an ambitious, agency-wide effort called Knowledge and Distributed Intelligence (KDI), these investments promise to change how we learn and create, how we work, and how we live. KDI is aimed at creating new ways of collecting, transforming, representing, transmitting, and using information to produce new dimensions of knowledge. The effort should lead to tremendous increases in scientific understanding of the roles of intelligence in complex systems, both natural and artificial.

Learning and Intelligent Systems

The Learning and Intelligent Systems (LIS) Program is an NSF-wide program that involves six directorates and is part of the overarching KDI effort. LIS encompasses the study of learning in natural and artificial systems. The goal of LIS is to energize radical and rapid advances in our understanding of learning, creativity, and productivity, as well as to develop the tools that will enhance the human ability to learn and create. The LIS program also embraces technology as an integral and unifying component of the education experience.

Directorate for Computer and Information Science and Engineering (CISE)

4201 Wilson Boulevard
Arlington, VA 22230
Tel: 703-306-1900
Fax: 703-306-0577
www.cise.nsf.gov

CISE programs improve the fundamental understanding of computing and information

processing in the broadest sense of the terms, enhance the training of scientists and engineers to contribute to that understanding, and encourage and facilitate the use of state-of-the-art information technologies and computational techniques in scientific and engineering research.

In addition to supporting research, CISE provides the general scientific community with access to advanced computing and networking capabilities. Partnerships for Advanced Computational Infrastructure give access to extremely powerful computing resources, train users, and develop the software required for effective use. Networking activities offer and build a national infrastructure for computer and human interaction, as well as communication for research and education. In addition, CISE supports capabilities for rapid prototyping of microelectronic components and systems for research and education, and educational development through various activities such as educational infrastructure and educational supplements.

SELECTED CISE FUNDING PROGRAMS:

Division of Networking and Communications Research and Infrastructure (NCRI):

- NSFNET: Supports the development, implementation, and testing of high performance networks and related technologies to further the collaboration and communications goals of the research and education communities in the United States. The program enables novel and/or advanced applications across all disciplines of research and education; coordinates connections with international research partners; and promotes the continuing analysis, improvement, and evolution of the Internet.
- Communications Research: Focuses on research that will facilitate the efficient representation and transmission of information through media that are not always reliable.
- Networking Research: Focuses on research to facilitate the efficient, high-speed transfer of information through networks and distributed systems.
- Special Projects in Networking and Communications Research: Supports networking and communications research projects that differ from those typically supported by other programs in NCRI.

Office of Cross-Disciplinary Activities (CDA):

- Educational Innovations: Supports innovative educational activities that transfer research results into undergraduate curricula in computer and information science and engineering.
- Research Infrastructure: Supports the enhancement of experimental research capabilities in computer and information science and engineering by providing experimental research facilities, technical staff, and maintenance. A separate element called CISE Minority Institutional Infrastructure focuses on computer and information science and engineering activities at schools with predominantly minority enrollments.
- Instrumentation: Supports the purchase of special-purpose equipment for research in all fields of computer and information science and engineering.
- Special Projects: Supports activities that expand opportunities for women, minorities, and persons with disabilities in computer and information science and engineering.
- Collaborative Research in Learning Technologies: Supports research at the interface of education and information technology for the future use of technology in education.

Digital Government Program
Division of Experimental and Integrative Activities
Room 1160
National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230
Tel: 703-306-1980
dgpd@nsf.gov

The goal of the Digital Government Program is to fund research at the intersection of the computer and information sciences research communities and the mid- to long-term research, development, and experimental deployment needs of the Federal information service communities.

Within this context, the objective of the Digital Government Program is to support projects that innovatively, effectively, and broadly address through research the potential improvement of agency, interagency, and intergovernmental operations and/or government/citizen interaction. Such research is expected to enable the generation and use of a continuous stream of advanced information technologies for early adoption and integration into the Federal information systems community.

Rural Systemic Initiatives
Directorate for Education and Human Resources
National Science Foundation
4201 Wilson Boulevard, Room 875
Arlington, VA 22230
Tel: 703-306-1684
www.ehr.nsf.gov

The RSI Program completes the trilogy of Educational System Reform efforts. The RSI goal is to promote systemic improvements in science, mathematics, and technology education for students in rural and economically disadvantaged regions of the Nation, particularly those that have been underserved by NSF programs, and to ensure sustainability of these improvements by encouraging community development activities in conjunction with instructional and policy reform.

Advanced Technological Education (ATE)
Division of Elementary, Secondary, and Informal Education (ESIE)
National Science Foundation
4201 Wilson Boulevard, Room 885
Arlington, VA 22230
Tel: 703-306-1614
www.ehr.nsf.gov

The ESIE Division, along with the Division of Undergraduate Education, supports projects that strengthen the science and mathematics preparation of technicians who are being educated for the high-performance workplace of advanced technologies.

The ATE Program supports the following types of activities involving secondary education: National and Regional Centers of Excellence for Advanced Technological Education; curriculum and instructional materials development, teacher enhancement, and student projects; and workshops, conferences, seminars, studies, and other special projects.

*Inquiries about postsecondary-level projects for the ATE Program should be directed to:
Division of Undergraduate Education
National Science Foundation
4201 Wilson Boulevard, Room 835
Arlington, VA 22230
Tel: 703-306-1668.

Research on Education, Policy, and Practice Program
Division of Research, Evaluation, and Communication (REC)
National Science Foundation
4201 Wilson Boulevard, Room 855
Arlington, VA 22230
Tel: 703-306-1650
www.ehr.nsf.gov

REC supports projects that merge research with classroom practices, especially those that lay foundations for the use of technology.

The Research on Education, Policy, and Practice (REPP) Program supports the cultivation of a research base for implementing innovative K-16 reform strategies, as well as ways of improving graduate, professional, informal, and lifelong learning.

Topics appropriate for consideration under the REPP Program include research focused on the use of technology—specifically, how tools that link individuals and institutions dispersed in space and across cultures can be used to teach and learn the changing content of science and mathematics. Topics also include how the evolving capacity of computers, including high performance computing and communications, can improve the teaching and learning of increasingly complex content, and alter what is taught through the power of technology to represent and manipulate concepts, processes, and knowledge.

SMALL BUSINESS ADMINISTRATION (SBA)

www.sba.gov
Ajoy K. Sinha
Acting Assistant Administrator
Native American Affairs
Small Business Administration
409 3rd St., SW
Washington, DC 20416
Tel: 1-800-U-ASK-SBA
202-205-1904 (Mr. Sinha)
www.sba.gov/financing (for 7(a) Guaranty Loan) (see "Loan Programs")
www.sba.gov/med (for 8(a) Program)

SBA LOAN PROGRAMS:

7(a) Loan Guaranty Program

The 7(a) Loan Guaranty Program is one of SBA's primary lending programs. It provides loans to small businesses unable to secure financing on reasonable terms through normal lending channels. The program operates through private-sector lenders that provide loans which are, in turn, guaranteed by the SBA. The agency has no funds for direct lending or grants.

Most lenders are familiar with SBA loan programs. Interested applicants should contact their local lender for further information and assistance in the SBA loan application process. Information on SBA loan programs, as well as the management counseling and training services offered by the agency, is also available from the local SBA office.

Uses accepted for loan: The proceeds of SBA loans can be used for most business purposes. These may include the purchase of real estate to house the business operations; construction, renovation, or leasehold improvements; acquisition of furniture, fixtures, machinery, and equipment; purchase of inventory; and working capital.

Office of Minority Enterprise Development (MED) Program—8a Program

The MED Program was created to assist socially and economically disadvantaged businesspersons to gain access to the resources necessary to develop small businesses and improve their ability to compete in the mainstream of the American economy.

The best known element of the MED Program is the 8(a) Program, named from Section 8(a) of the Small Business Act. The 8(a) Program is a business development program that provides its participants access to a variety of business development services, including the opportunity to receive federal contracts on a sole-source or limited competition basis. Under the 8(a) Program, SBA enters into prime contracts with federal departments and agencies and subcontracts the performance of work to disadvantaged small businesses that are certified participants in the program.

Office of Native American Affairs (ONAA)

The SBA's Office of Native American Affairs develops initiatives that ensure Native individuals have access to business-development resources, training, and services in their communities. ONAA's main focus is economic development and job creation through small business ownership and education. The office works with individual and tribally owned organizations; other federal, state and local agencies; nonprofit organizations; and national Native American organizations. Services are delivered through SBA field offices, small business development centers, and reservation-based Tribal Business Information Centers (TBICs).

U.S. DEPARTMENT OF AGRICULTURE (USDA)

www.usda.gov

Cooperative State Research, Education, and Extension Service (CSREES)
U.S. Department of Agriculture
Washington, DC 20250-0900
Tel: 202-720-3029
Fax: 202-690-0289
www.usda.gov/CSREES
* *For detailed information, contact the USDA national office, your local county extension office (offices are listed under local government in the telephone directory) or a land-grant university.*

The new Cooperative State Research, Education, and Extension Service is positioned for the 21st century as a dynamic change agent and international research and education network. In cooperation with its partners and customers, CSREES provides the focus to advance a global system of research, extension, and higher education in the food and agricultural sciences and related environmental and human sciences to benefit people, communities, and the Nation.

CSREES links the research and education programs of the USDA and works with: land-grant institutions in each state, territory, and the District of Columbia; more than 130 colleges of agriculture; 59 agricultural experiment stations; 57 cooperative extension services; 63 schools of forestry; 16 1890 historically black land-grant institutions and Tuskegee University; 27 colleges of veterinary medicine; 42 schools and colleges of family and consumer sciences; twenty-nine 1994 Native American land-grant institutions; 190 Hispanic-Serving Institutions.

Rural Business - Cooperative Service (RBCS)

U.S. Department of Agriculture
Washington, DC
Tel: 202-720-4323
www.rurdev.usda.gov
* *For detailed information, contact your state USDA Rural Development office.*

The mission of RBCS is "to enhance the quality of life for rural Americans by providing leadership in building competitive businesses including sustainable cooperatives that can prosper in the global marketplace."

These goals are met by investing financial resources and providing technical assistance to businesses and cooperatives located in rural communities, and by establishing strategic alliances and partnerships that leverage public, private, and cooperative resources to create jobs and stimulate rural economic activity.

RBCS FUNDING PROGRAMS:

Business Programs

Promoting a dynamic business environment in rural America is the goal of the RBCS Business Programs (BP). BP works in partnership with the private sector and the community-based organizations to provide financial assistance and business planning. BP helps fund projects that create or preserve quality jobs and/or promote a clean rural environment. Recipients of these programs may include individuals, corporations, partnerships, cooperatives, public bodies, nonprofit corporations, Indian tribes, and private companies.

Funding programs include: Business and Industry Direct Loans; Business and Industry Guaranteed Loans; Rural Business Enterprise Grants; Rural Business Opportunity Grants; Rural Economic Development Loans; and Rural Economic Development Grants.

Cooperative Programs: Rural Technology and Cooperative Development Center Grant Program

The Rural Technology and Cooperative Development Center Grant Program provides grants to public bodies and private, nonprofit organizations serving rural areas outside the boundary and adjacent urbanized area of a city with a population of 50,000. Grants may be made for the establishment and operation of a center for rural technology or cooperative development.

Rural Utility Service (RUS)

Orren E. Cameron III, Acting Assistant Administrator
or
Craig Wulf, Acting Deputy Assistant Administrator
Telecommunications Program
U.S. Department of Agriculture
Room 4046, South Bldg., Stop 1590
Washington DC 20250
www.usda.gov/rus/dlt/dlml.htm

RUS is the federal "point" agency for rural infrastructure assistance in electricity, water, and telecommunications. As a federal credit agency in the USDA, RUS provides a leadership role in lending and technical guidance for the rural utilities industries.

RUS FUNDING PROGRAMS:

Telecommunications Loans

RUS telecommunications lending creates public-private partnerships to finance the construction of the telecommunications infrastructure in rural America. RUS is a vital source of financing and

technical assistance for rural telecommunications systems.

Distance Learning and Telemedicine

The Distance Learning and Telemedicine Grant and Loan Program (DLT) was created to encourage, improve, and make affordable the use of telecommunications, computer networks, and related technology for rural communities to improve access to educational and/or medical services.

The DLT program is "hardware intensive," but other costs, limited to the capital costs of establishing the project (such as software, training, and technical assistance) may be considered.

RUS will fund up to 90 percent of the costs of acquiring eligible equipment for requested loans. RUS will fund up to 70 percent of the costs of acquiring eligible equipment for grants, combination grant and loans, and all applications not specifically requesting loans.

Rural Telephone Bank

The Rural Telephone Bank, established in May 1971, provides a supplemental source of financing under RUS's telecommunications loan program. The Bank lends to rural telecommunications organizations.

U.S. DEPARTMENT OF COMMERCE (DOC)

www.doc.gov

Economic Development Administration (EDA)
Phillip A. Singerman, Assistant Secretary
U.S. Department of Commerce
14th & Constitution Avenue, NW, Room 7804
Washington, DC 20230
Tel: 202-482-5081
Fax: 202-273-4781
psingerm@doc.gov
www.eda.doc.gov

EDA FUNDING PROGRAMS:

Public Works and Development Facilities Program

Grants are provided to help distressed communities attract new industry, encourage business expansion, diversify local economies, and generate long-term, private sector jobs. Projects funded include: water and sewer facilities primarily serving industry and commerce; access roads to industrial parks or sites; port improvements; and business incubator facilities.

Research and Evaluation Program

Under the Research and Evaluation program, grants and cooperative agreements are awarded: 1) to undertake studies that will increase knowledge about emerging economic development issues, the causes of economic distress, and ways to alleviate barriers to economic development; and 2) to measure the performance and effectiveness of economic development programs.

Planning Program for Economic Development Districts, Indian Tribes, and Redevelopment Areas

Grants under this program support the formulation and implementation of economic development programs designed to create or retain full-time permanent jobs and income for the unemployed and underemployed in areas of economic distress.

Local Technical Assistance Program

Grants awarded under the Local Technical Assistance Program are designed to assist in solving specific economic development problems, respond to developmental opportunities, and build and expand local organizational capacity in distressed areas. The majority of local technical assistance projects might focus on technical or market feasibility studies of economic development projects or programs.

National Telecommunications and Information Administration (NTIA)

Roanne Robinson, Special Assistant (Hopi)
U.S. Department of Commerce
National Telecommunications and Information Administration
Washington, DC 20230
Tel: 202-482-0516
Fax: 202-482-1635
rrobinson@ntia.doc.gov
www.ntia.doc.gov

NTIA FUNDING PROGRAMS:

Telecommunications and Information Infrastructure Assistance Program (TIIAP)

Stephen Downs, Director
Telecommunications and Information Infrastructure Assistance Program
Office of Telecommunications and Information Applications
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW, Room 4096
Washington, DC 20230
Tel: 202-482-2048
Fax: 202-501-5136
tiiap@ntia.doc.gov

TIIAP is a highly competitive, merit-based grant program that brings the benefits of an advanced national information infrastructure to communities throughout the United States.

TIIAP provides matching grants to nonprofit organizations such as schools, libraries, hospitals, public safety entities, and state and local governments. Grants are used to fund projects that improve the quality of, and the public's access to, education, health care, public safety, and other community-based services.

Public Telecommunications Facilities Planning and Construction (PTFP)

Dennis R. Connors, Director
Public Telecommunications Facilities Program
Office of Telecommunications and Information Applications
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW, Room 4625
Washington, DC 20230
Tel: 202-482-5802
Fax: 202-482-2156
ptfp@ntia.doc.gov

NTIA administers the Public Telecommunications Facilities Program (PTFP), which assists, through matching grants, in the planning and construction of public telecommunications facilities.

Research and Evaluation

Francine Jefferson, Ph.D.
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW, Room 4096
Washington, DC 20230
Tel: 202-482-2048
Fax: 202-501-5136
tiiap@ntia.doc.gov

TIIAP is soliciting proposals for research and evaluation relating to the diffusion of telecommunications and information technology applications in the public and nonprofit sectors. Specifically, NTIA is interested in funding proposals that pertain to: 1) interoperability and scalability of telecommunications and information technology systems and networks; 2) community involvement in the development and implementation of technology mediated projects; 3) reducing disparities and providing access to information infrastructure technologies; 4) telecommunications and information technology-induced organization change, including emerging forms of partnerships and collaborations; 5) innovative techniques and methodologies for evaluating applications of telecommunications and information technology projects in the public and nonprofit sectors; and 6) assessments of future information infrastructure needs in these sectors.

U.S. DEPARTMENT OF DEFENSE

Jerry Franck
Tel: 202-767-4970
Fax: 202-767-5012
jerome.franck@afosr.af.mil
www.defenselink.mil

The Air Force Office of Scientific Research, Army Research Office, and Navy Research Office have partnered with tribes and other government agencies, such as the Department of Energy (DOE) and NASA, in programs aimed to improve the level of science, technology, and mathematics research capabilities among tribal colleges and research institutions. Examples of such programs are the Tribal College Initiative, which is led by DOE and currently funds three tribal colleges; and a telecommunications infrastructure project with NASA and Diné College.

U.S. DEPARTMENT OF EDUCATION

www.ed.gov

600 Independence Avenue, SW
Washington, DC 20202-0498
1-800-USA-LEARN
Funding Programs:
Comprehensive Regional Assistance Centers
Edith Harvey
U.S. Department of Education
OESE, School Improvement Programs
600 Independence Avenue, SW
Portals Building, Room 4500
Washington DC 20202-6140
Fax: 202-205-5630
Tel: 202-260-1393
Edith_Harvey@ed.gov

This program funds 15 grantees that provide comprehensive training and technical assistance services to states, local education agencies, schools, Indian tribes, community-based organizations, and other recipients of federal funds under the Elementary and Secondary Education Act (ESEA). The purpose of the centers is to help coordinate and integrate the implementation of ESEA and other federal education programs with state and local activities in ways that support federal, state, and local efforts to improve teaching and learning and increase the academic achievement of all children. Implementing education applications of technology is included in the scope of this program.

Regional Technical Support and Professional Development Consortia for Technology (R*TECs)

Catherine Connor
Office of Educational Research and Improvement
Office of Reform Assistance and Dissemination
555 New Jersey Avenue, NW
Washington, DC 20208-5544
Tel: 202-219-8070
Fax: 202-208-4042
Cconnor@inet.ed.gov

This program supports six consortia that conduct regional programs of professional development, technical assistance, and dissemination of information resources that address the particular needs of educators and learners. Funds are used by the consortia to support preservice and in-service training for educators, technology planning assistance, and dissemination of information and resources. The consortia identify and disseminate information on planning for the acquisition of technology, research and development (R&D) solutions, and applications of technology that improve instruction and student learning.

Small Business Innovation Research (SBIR) Program
Office of Educational Research and Improvement
555 New Jersey Ave., NW
Washington, DC 20208-5544
Tel: 202-219-2004
Fax: 202-219-1407
Lee_Eiden@ed.gov

This program funds research projects that propose a sound approach to the investigation of an important engineering or scientific question under topics identified each year in the request for proposal. The purpose of the program is to: stimulate technological innovation; increase small business participation in federal research and development; foster and encourage participation by minority and disadvantaged persons in technological innovation; and increase private sector commercialization of technology derived from federal research and development.

School-to-Work Opportunities Act
National School-to-Work Office
400 Virginia Ave., SW
Room 210
Washington, DC 20024
Tel: 202-401-6222
www.stw.ed.gov

This Act, signed in 1994, provides seed money to states and local partnerships of business, labor, government, education, and community organizations to develop school-to-work systems. It allows states and their partners to bring together efforts at education reform, worker preparation, and economic development to create a system to prepare youth for the high-wage, high-skill careers of a global economy.

Star Schools Program
Joseph Wilkes
Office of Educational Research and Improvement
Office of Reform Assistance and Dissemination
555 New Jersey Avenue, NW
Washington, DC 20208-5645
Tel: 202-219-2186
Fax: 202-219-2053
Joseph_Wilkes@ed.gov

This program provides grants to eligible telecommunications partnerships to encourage improved instruction in mathematics, science, foreign language, literacy skills, vocational education, and other subjects; and to serve underserved populations through the development, construction, and acquisition of telecommunications facilities, equipment, and instructional programming. Grants are made for: 1) general star schools grants, 2) statewide grants, and 3) high school completion and adult literacy grants. Grants are also made for a special local network project, and for leadership, dissemination, and evaluation activities.

Technology Innovation Challenge Grant Program
Elizabeth Payer
Office of Educational Research and Improvement
Office of Reform Assistance and Dissemination
555 New Jersey Avenue, NW
Washington, DC 20208-5544
Tel: 202-208-3882
Fax: 202-208-4042
elizabeth_payer@ed.gov
www.ed.gov/Technology/challenge

This program provides grants to consortia to improve and expand new applications of technology that strengthen the school reform effort, improve student learning, and provide sustained professional development of teachers, administrators, and school library media personnel.

Technology Literacy Challenge Fund
Thomas Fagan
U.S. Department of Education
OESE, Goals 2000
600 Independence Avenue, SW
Portals Building, Room 4000
Washington DC 20202-6100
Tel: 202-401-0039
Fax: 202-205-0303
Thomas_Fagan@ed.gov

These grants support the development and implementation of systemic technology plans at the state, local, and school levels to improve the teaching and learning of all children. The four major goals of the program are: 1) All teachers will have the training and support they need to help all students learn through computers and through the information superhighway, 2) All teachers and students will have modern computers in their classrooms, 3) Every classroom will be connected to the information superhighway, and 4) Effective and engaging software and online resources will be an integral part of every school curriculum.

Projects include applying technology to support school reform; acquiring hardware and software to improve student learning; acquiring connections to telecommunications networks to obtain access to resources and services; ongoing professional development in the integration of technology to improve the school curriculum; and providing better education services for adults and families.

(Funds are awarded to states. The states then distribute most of their funds to local agencies selected by competition.)

U.S. DEPARTMENT OF ENERGY (DOE)
www.doe.gov

Lawrence Livermore National Laboratory
Steve Grey
American Indian Program Manager
Lawrence Livermore National Laboratory (LLNL)
Department of Energy/LLNL Field Office
P.O. Box 580
Shiprock, NM 87420
Tel: 505-368-5126
grey1@llnl.gov

The LLNL's American Indian Program provides a wide range of services to tribes and tribal institutions needing assistance with telecommunications and technology issues. LLNL will, upon request, provide: human resource-technical assistance (assessments, evaluations, second opinions on questions, etc.); planning grants (often in cooperation with other federal agencies); meetings facilitation; and training. Examples of collaborative projects include a project with Diné College funded by the Tribal College Initiative and a distance-learning infrastructure project with the Northern Arizona University.

Tribal College Initiative
Estella Ramo, Program Manager
Oakland Operations Center
Human Resources Management Division
1301 Clay Street
Oakland, CA 94612-5208
Tel: 510-637-1839
Fax: 510-637-2008
estela.romo@oak.doe.gov

Funded by the Department of Defense (DOD), the Tribal College Initiative promotes collaborative research in major laboratories; strengthens programs in engineering, science and math; funds instrumentation purchases; and provides technical assistance to enhance the ability of minority institutions to successfully compete for DOD funding in the future. Tribal colleges receiving funding include the Southwestern Indian Polytechnic Institute, Diné College, and Crownpoint Institute of Technology.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES (HHS)

www.hhs.gov

Administration for Native Americans (ANA)
U.S. Department of Health & Human Services
Administration for Children & Families
Administration for Native Americans
Mail Stop HHH 348F
370 L'Enfant Promenade
Washington, D.C. 20447-0002
Tel: 202-690-7776
Fax: 202-690-7441 or 8145
Internet: www.acf.dhhs.gov/programs/ana

ANA promotes the social and economic self-sufficiency of American Indians, Alaska Natives, Native Hawaiians, and other Native American Pacific Islanders, including Native Samoans. This goal is supported largely through awarding grants with social and economic development strategies (SEDS). These are competitive financial assistance grants in support of locally determined and designed projects to address community needs and goals.

Examples of the range of projects that help to promote the economic and social development of Native Americans include: creation of new jobs and development or expansion of business enterprises and social service initiatives; establishment of new tribal employment offices; formulation of environmental ordinances and training in the use and control of natural resources; enactment of new codes and management improvements to strengthen the governmental functions of tribes and Native American organizations; and establishment of local court systems.

Indian Health Service (IHS)
Dr. Richard Church, Associate Director
or
James Garvie, Acting Deputy Associate Director
Division of Information Technology
Indian Health Service
Parklawn Building
5600 Fishers Lane
Rockville, MD 20857
Tel: 301-443-1064
www.ihs.gov
Thomas J. Fisher, Director
Information Technology Support Center
Division of Information Resources
Office of Management Support
Indian Health Service
5300 Homestead Road, NE
Albuquerque, NM 87110
Tel: 505-248-4219
Tom.Fisher@mail.ihs.gov

The IHS is the principal federal health care provider and health advocate for American Indian and Alaska Native peoples, and its goal is to raise their health status to the highest possible level. The IHS currently provides health services to approximately 1.4 million American Indians and Alaska Natives who belong to more than 545 federally recognized tribes in 34 states.

Although the IHS mission does not include funding, it provides much-needed services through other means. The IHS has a system of 37 hospitals, 64 health centers, 50 health stations, 5 school health centers, and 34 urban Indian health projects that provide a wide range of health and referral services. The IHS Network is a closed-network system that allows all of these health facilities to be connected to each other and to the Internet. E-mail, patient data, x-rays, and accounting and third-party billing are also handled through the IHS Network.

The IHS is working on an agreement with the Bureau of Indian Affairs (BIA) and the Navajo Nation to share data lines in an effort to reduce costs. Lines are currently being shared within the Navajo Nation and between Albuquerque, NM and Aberdeen, SD.

The IHS also provides teleradiology from the Shiprock, NM, hospital to the University of New Mexico.

Office of Rural Health Policy (ORHP): Rural Health Outreach Network Development Grant Program†
Eileen Holloran (general info) or Cathy Wasem (telehealth applications)
Tel: 301-443-0835
Fax: 301-443-2803
Toll-free: 1-888-300-4772 (for application kit)
Fax: 301-309-0579†
eholloran@hrsa.dhhs.gov or
cwasem@hrsa.dhhs.gov†
http://www.nal.usda.gov/ric/richs/funding.htm†

Legislation passed in September 1996 reshaped the former Rural Health Outreach Grant Program to emphasize support for development of self-sustaining, integrated health care networks in rural areas. However, funding remains available for informal network projects similar to those funded under the original Rural Health Outreach Grant program; i.e., projects that demonstrate new and innovative models or outreach and health care services delivery in rural areas. Grant funds can be used to purchase equipment or vehicles, provided that their cost does not exceed 40 percent per year of the federal grant amount. Funds under this program may not be used for the purchase, construction, renovation, or improvement of a building or property.

Rural Telemedicine Grant Program
Cathy Wasem or Amy Barkin
Office of Rural Health Policy
HRSA, 5600 Fishers Lane, Room 9-05
Rockville, MD 20857
Tel: 301-443-0835
cwasem@hrsa.dhhs.gov or abarkin@hrsa.dhhs.gov.

The purpose of the Rural Telemedicine Grant Program is to facilitate the development of rural health care networks through the use of telemedicine, and to develop a baseline of information for the systematic evaluation of telemedicine systems serving rural areas. Grants supported under this program aim to "expand access to, coordinate, restrain the cost of, and improve the quality of essential health care services, including preventive and emergency services, through the development of integrated health care delivery systems or networks in rural areas and regions."

The goal of ORHP's Rural Telemedicine Grant Program is to improve access to quality health services for rural residents and reduce the isolation of rural practitioners through the use of telemedicine technologies.

Small Business Innovation Research (SBIR) Grants
Marilyn Lewis-Taylor
HCFA Grants Office
Health Care Financing Administration
Office of Internal Customer Support
Acquisition and Grants Group
7500 Security Boulevard, C2-21-15
Baltimore, MD 21244-1850
Tel: 410-786-5701
Carl Hackerman
Office of Strategic Planning
Health Care Financing Administration
7500 Security Boulevard, C3-11-17
Baltimore, MD 21244-1850
Tel: 410-786-6644
Chackerman@hcfa.gov

The Small Business Innovation Development Act of 1982, as amended, requires federal agencies to reserve a portion of their extramural research and budgets for an SBIR Program. The principal purpose of HCFA's SBIR Program is to provide assistance to creative applicants to encourage innovation that will result in an improved health care financing and delivery system.

HCFA solicits grant applications and awards grants for its SBIR Program under a 2-year cycle. In the first year, Phase I grants are awarded to establish the technical merit and feasibility of proposed research or demonstration, and to provide information to assess the quality of performance of the awardee organization before furnishing further federal support in Phase II. Phase I grant awards are usually approximately $50,000 for a period not to exceed 12 months.

In the second year of the cycle, a limited number of the Phase I grantees receive additional funding to continue the research initiated in Phase I. During Phase II, the grantees actually create the proposed product and test it before marketing. Funding decisions are based on the results of Phase I and the technical merit of the Phase II application, including its potential for commercialization. (Only Phase I awardees are eligible to apply for Phase II funding.) Phase II awards usually are approximately $100,000 to $150,000, for a period normally not to exceed 12 months.

U.S. DEPARTMENT OF THE INTERIOR (DOI)

BUREAU OF INDIAN AFFAIRS (BIA)

Geographic Data Service Center (GDSC)
3000 Youngfield St., Suite 230
Lakewood, CO 80215
Tel: 303-231-5100
303-231-5120 (Helpdesk)
Fax: 303-231-5122
gdsc@gdsc.bia.gov
http:/gdsc.bia.gov

GDSC's mission is to develop and implement policies, procedures, standards, goals, and objectives for all spatial data technologies and applications throughout BIA. In accomplishing this mission, GDSC supports tribal and BIA offices in the implementation process. Services and support include, but are not limited to: Geographic Information Systems (GIS) and support; remote sensing/image processing; Global Positioning Systems (GPS); centralized and decentralized computer operations; technical help desk; database development; and training and workshops.

Office of Indian Education Programs (OIEP)
William (Bill) Mehojah, Deputy Director
1849 C Street, NW
Mail Stop 3512
Washington, DC 20240
Tel: 202-208-6175
www.doi.gov/bureau-indian-affairs.html (BIA)
www.warrior.unm.edu (OIEP)

The mission of OIEP is to provide quality education opportunities from early childhood throughout life, in accordance with the tribe's needs for cultural and economic well-being in keeping with the wide diversity of Indian Tribes and Alaska Native villages as distinct

cultural and governmental entities. Funding programs and special projects include: Access Native America (connecting all schools served by the BIA to the Internet), and individual programs through the Branch of Elementary and Secondary Programs, Branch of Supplemental Support Services, Branch of Exceptional Education, Branch of Post Secondary Education and OIEP Staff Development.

U.S. DEPARTMENT OF JUSTICE (DOJ)
www.usdoj.gov

Office of Justice Programs (OJP)

Matthew Beccio, AI/AN Affairs Desk
810 Seventh Street, N.W.
Washington, DC 20531
Tel: 202-514-1251
Fax: 202-514-7805
becciom@ojp.usdoj.gov
www.ojp.usdoj.gov

The OJP works within its established partnership arrangements with federal, state, and local agencies, as well as national and community-based organizations, to develop, fund, and evaluate a wide range of criminal and juvenile justice programs. These programs often include technological components, such as establishing computer networks and information management systems.

The American Indian and Alaska Native (AI/AN) Affairs Desk in OJP is responsible for enhancing access to information by federally recognized American Indian and Alaska Native tribes regarding funding opportunities, training and technical assistance, and other relevant information. Additionally, the American Indian & Alaska Native Affairs Desk coordinates with the Office of Tribal Justice on department-wide AI/AN initiatives.

PRIVATE AND CORPORATE FOUNDATIONS

This section is limited to a selection of private and corporate foundations that have been mentioned in recent articles or publications.

PRIVATE FOUNDATIONS

The following list of private foundations has been compiled through new research conducted for this report and from the recommendations and citations of Timothy Walter, author of "Funding Resources for Community Technology Projects: Focusing on Community Networks, Neighborhood Telecenters and Rural Televillages," and Arthur Sheekey, author of "Education and Telecommunications: Critical Issues and Resources."

The foundations listed have at some point funded projects relating to telecommunications, technology, or networking in the community and schools. It is not assured that they have designated funding programs for those issues; the funding may come from another overarching grant area, such as education. To find out more about these foundations, go to the nearest public library and visit its Foundation Center collection, which will have detailed information on any private foundation you wish to approach.

Annenberg Foundation
St. Davids Center, A-200
150 Radnor-Chester Road
St. Davids, PA 19087
610-341-9006

The Annie E. Casey Foundation
701 St. Paul Street
Baltimore, MD 21202
410-547-6600

Educational Foundation of America
35 Church Lane
Westport, CT 06880-3515
203-226-6498

Ewing Marion Kauffman Foundation
4900 Oak Street
Kansas, MO 64112
816-932-1000

Ford Foundation
320 East 43rd Street
New York, NY 10017
212-573-5000

The William & Flora Hewlett Foundation
525 Middlefield Road, Suite 200
Menlo Park, CA 94025-3495
(415) 329-1070
Contact: David Pierpoint Gardner, President

Howard Heinz Endowment
30 CNG Tower
625 Liberty Avenue
Pittsburgh, PA 11522-3199
412-281-5777
Contact: Frank Tugwell, Executive Director

The James Irvine Foundation
One Market Plaza, Spear Tower, Suite 1715
San Francisco, CA 94105
415-777-2244
**California focused*

Joyce Foundation
135 South LaSalle St. Suite 4010
Chicago, IL 60603
312-782-2464

The W.K. Kellogg Foundation
One Michigan Avenue, East
Battle Creek, MI 49017-4058
616-968-1611

Knight Foundation
2 South Biscayne Blvd., Suite 3800
Miami, FL 33131-1803
305-539-0009

MacArthur Foundation
140 South Dearborn St., Suite 1100
Chicago, IL 60603
312-726-8000

The John & Mary R. Markle Foundation
75 Rockefeller Plaza, Suite 1800
New York, NY 10019-6908
212-489-6655
Contact: Andrew Blau

McKnight Foundation
600 TCF Tower
121 South Eighth Street
Minneapolis, MN 55402
612-333-4220
Contact: Marilyn Pidany, Vice President for Administration

The Charles Stewart Mott Foundation
1200 Mott Foundation Building
Flint, MI 48502-1851
313-238-5651

The David and Lucille Packard Foundation
300 2nd Street, Suite 200
Los Altos, CA 94022
415-948-7658
www.packfound.org
Contact: Colburn S. Wilbur, Executive Director

BEST COPY AVAILABLE

Pew Charitable Trusts
One Commerce Square
2005 Market Street, Ste.1700
Philadelphia, PA 19103-7017
215-575-9050

Rockefeller Foundation
420 Fifth Avenue
New York, NY 10018-2702
212-869-8500
Contact: Jamie Jensen, Senior Research Associate

Schuman Foundation
33 Park Street
Montclair, NJ 07042
201-783-6660

The Alfred P. Sloan Foundation
630 Fifth Avenue, Suite 2550
New York, NY 10111
212-649-1649

Spencer Foundation
900 North Michigan Avenue, Suite 2800
Chicago, IL 60611
312-337-7000
Contact: Dr. Patricia Graham, President

ADDITIONAL FUNDING SOURCES

Community Technology Centers Network (CTCNet)
Education Development Center
55 Chapel Street
Newton, MA 02458-1060
Tel: 617-969-7100 ext. 2727
Fax: 617-332-4318
Contact: Peter Miller
peterm@ctcnet.org.
www.ctcnet.org/mira

The Civil Rights Forum on Communications Policy
818 18th St., NW, Suite 505
Washington, DC 20006
Tel: 202-887-0301
Fax: 202-887-0305
www.civilrightsforum.org
forum@civilrightsforum.org

The CTCNet and the Civil Rights Forum have been designated as Policy Support Organizations of the Kellogg Foundation's Managing Information with Rural America (MIRA) Project, overseeing the distribution of $70,000 in grants over the remainder of 1999. As determined by the Foundation, the Forum and CTCNet will:

- inform and educate rural communities about rural policy;
- use technology to serve rural communities in their policy efforts; and
- promote a two-way exchange of information with rural communities in an effective, inclusive way.

The Civil Rights Forum, a project of the Tides Center, connects communications policy to the needs of minority and poor communities through national networking, research, public policy monitoring and action, and local organizing. The Forum works with groups experimenting with economic development and public interest applications of new technologies; civil rights and grassroots community activists; and communications policy activists, researchers, and lawyers.

The nation's largest affiliation of community-based technology centers in underserved neighborhoods, CTCNet assists communities in harnessing information technology to support their needs. It provides written, electronic, and in-person linkages through its Web site, electronic discussion lists, regional and national conferences, and support for affiliate members through corporate partnerships.

ESRI
380 New York Street
Redlands, CA 92373-8100
Contact: Charles Convess
Tel: 909-793-2853
Fax: 909-793-5953
www.esri.com/base/users/conservation/conservation.html

FUNDING PROGRAMS:

ESRI Conservation Program (ECP)

ECP supports conservation groups and related nonprofit local, international, and indigenous organizations in acquiring, learning, and using Geographic Information System (GIS) tools and methods. ECP has a particular focus on providing appropriate levels of technology for locally sustainable programs. Its goal is to build permanent, locally based support structures that provide ongoing evolutionary growth in GIS skills. For a grant information package/form, send a blank email to ecpform@esri.com.

CTSP System Grants for Conservation Non-Profits

The Conservation Technology Support Program is a partnership between hardware and software vendors and the nonprofit conservation community to provide annual grants of complete GIS centers to grassroots organizations active in conservation. The partners are: Hewlett Packard Corp. (PC's, printers, plotters); Apple Computer (computers, printers, digital cameras); ESRI (GIS software, training); Trimble Navigation (GPS navigation units); GTCO (digitizing boards); Iomega, (mass storage); ERDAS Inc, (Image Processing); Microsoft (productivity software); Smithsonian (training); and Conservation GIS Consortium (administration). The annual grants may be applied for at ctsp@desktop.org between October and January 15, and the decision whether or not to continue the program is made each September.

GIS for Native and Indigenous Groups

ECP also manages grants to Native American, First Nation, and Indigenous groups worldwide. The Intertribal GIS Council is a Native American Association helping in this program.

First Nations Development Institute
11917 Main Street
Fredericksburg, VA 22408
Tel: 540-371-5615
Fax: 540-371-3505
Internet: www.firstnations.org

The First Nations Development Institute is a Native American nonprofit organization founded in 1980 to promote culturally appropriate economic development by and for Native peoples. The organization serves as an educator, advocate, researcher, grant-giver, fundraiser, and point of reference for information, resources, and ideas. Examples of the funding programs administered by First Nations is the Eagle Staff Fund, which provides technical assistance and grants to tribes and reservations, or to rural Native nonprofits engaged in community-driven, culturally based economic development.

OMB Watch
1742 Connecticut Avenue, NW
Washington, DC 20009-1171
Tel: 202-234-8494
grants@ombwatch.org
http://ombwatch.org/www/ombw/npt

Nonprofits and Technology Project (NTP)

The NTP is coordinated by OMB Watch and includes more than two dozen community-based organizations, technology programs, and foundations. Its goal is to explore new and powerful ways to use technology for civic participation, greater responsiveness, and more creative and effective forms of democratic intervention in political processes. The Awards Project and Pilot Project both provide cash awards to existing and new projects. Deadline for Awards nominations is May 17, 1999, and for Pilot proposals is May 3, 1999.

CORPORATE FOUNDATIONS

The following selection of corporate foundations was compiled from new research conducted for this report and from "Funding Resources for Community Technology Projects: Focusing on Community Networks, Neighborhood Telecenters and Rural Televillages," and "Education and Telecommunications: Critical Issues and Resources."

When considering corporate partners and/or funding sources, it is important to explore your local and state resources. Local companies or branch offices of major corporations may have community-focused programs that might fit your needs. Some companies handle their partnership or funding programs through their Marketing or Public Relations departments. These are potential points of contact.

CORPORATE FUNDING SOURCES:

Ameritech Foundation
30 S. Wacker Drive, 34th Floor
Chicago, IL 60606
312-750-5223
www.ameritech.com

AOL Foundation
22000 AOL Way
Dulles, VA 20166
703-265-1342
703-265-2135 fax
E-mail: AOLGrants@aol.com
www.aol.com/corp/phil

Apple Computer, Inc.
One Infinite Loop
Cupertino, CA 95014
408-974-2974
www.apple.com/education

Asanté Networking Grant Program
Asanté Technologies, Inc.
821 Fox Lane
San Jose, CA 95131-1601
408-435 8388
www.asante.com

AT&T Foundation
1301 Avenue Of The Americas
Rm. 3124
New York, NY 10019
212-841-4747
www.att.com/foundation

Bell Atlantic Foundation
1310 North Court House Road, 10th Floor
Arlington, VA 22201
703-974-8845
www.nynexfoundation.com
Contact: James A.Smith, Director

BellSouth Foundation
1155 Peachtree Street NE
Atlanta, GA 30309-3610
404-249-2414
www.bsf.org/bsf
Contact: Patricia L. Willis, President

Cisco Networking Academies Program
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
408-526-4000, 1800-553-NETS (6387)
www.cisco.com/edu

Compaq
Compaq's Teaching with Computer Technology Grant Program
23052 Alicia Parkway #H414
Mission Viejo, CA 92692
800-AT-COMPAQ
www.compaq.com/education/k12

BEST COPY AVAILABLE

Digital Equipment Corporate Giving Program
111 Powder Mill Rd, MSO1-1/L14
Maynard, MA 01754-2571
508-493-9210; 508-493-9210
www.digital.com/info/community/contrib.html
Contact: Jane Hamel, Manager, Corporate Contributions

General Electric Company Fund
3135 Easton Tpke.
Fairfield, CT 06431
www.ge.com/fund
203-373-3216
Contact: Edith Nelson
edith.nelson@corporate.ge.com

GTE Foundation
One Stamford Forum
Stamford, CT 06904
203-965-3620
www.gte.com
Contact: Maureen V. Gorman, Vice President

Hewlett-Packard Foundation
P.O. Box 10301
Palo Alto CA, 94303-0890
www.corp.hp.com/Publish/UG
415-857-3053

IBM Corporate Contributions Program
Old Orchard Road
Armonk, NY 10504
914-765-5242; 914-765-7617;
914-765-6435
www.ibm.com/IBM/IBMGives
Contact: Stanley Litow, Director, Corporate Support programs

Intel Foundation
5200 NE Elam Young Pkwy
Hillsboro, OR 97124-6497
503-696-8093
www.intel.com/intel/community/grants.htm

Intel Corporate Contributions
Dept. JF3-127
5200 N.E. Elam Young Pkwy
Hillsboro, OR 97124-6497
503-264-1869
www.intel.com/intel/community/contributions

Lucent Technologies Foundation
600 Mountain Avenue, Suite 700
Philadelphia, PA 19103-7017
908-582-5210
www.lucent.com/what/community
Contact: Marianne Carlton
E-mail: macarlton@lucent.com

MCI Foundation
1801 Pennsylvania Avenue NW
Washington, DC 22206
202-887-3247
www.mci.com
Contact: Charles Sweeney, Director

Microsoft Corporation
One Microsoft Way
Redmond, WA 98042-6399
206-882-8080
www.microsoft.com/giving
Contact: Barbara J. Dingfield, Manager of Corp. Contributions

Mitsubishi Electric America Foundation
1150 Connecticut Avenue NW
Suite 1020
Washington, DC 20036
www.mitsubishielectric.com/mea/groups/meaf.html
202-857-0031

NEC Foundation Of America
8 Old Sod Farm Road
Melville, NY 11747
www.nec.com
516-753-7021, 1800-338-9549

Oracle Corporation – "Oracle's Promise"
500 Oracle Parkway, MS5OP428
Redwood Shores, CA 94065
415-506-7000
www.oracle.com/promise
Contact: Deborah Choyne

Pacific Telesis Foundation (PacTel)
130 Kearny St., Room 3309
San Francisco, CA 94108
415-394-3693
www.pactel.com
Contact: Jere A. Jacobs, President

Panasonic Foundation
2 Panasonic Way, 7G7-A
Secaucus, NJ 07094
201-392-4131
www.panasonic.com
Contact: Dr. Sophie Sa, Executive Director

Sprint Foundation
2330 Shawnee Mission Pkwy
Westwood, KS 66205
913-624-3343
www.sprint.com/sprint/overview/commun.html#4

Toyota USA Foundation
19001 S. Western Ave.
Torrence, CA 90509
310-618-6766
www.toyota.com/inside_toyota/application
Contact: William Pauli, Administrator

U.S. WEST Foundation
7800 E. Orchard Road, Suite 300
Englewood, CO 80111
303-896-9967
www.uswf.org
Contact: Jeanne Bistranin, U.S. WEST Foundation RPO

Xerox Corporation
P.O. Box 1600
Stamford, CT 06904
www.xerox.com
Contact: Joseph Cahalan, Vice President, Corp. Communications and Public Relations

ADDITIONAL RESOURCES

***Education and Telecommunications: Critical Issues and Resources*. Arthur Sheekey, Information Gatekeepers, Inc., 1997.**

Funding Resources for Community Technology Projects: Focusing on Community Networks, Neighborhood Telecenters and Rural Televillages. Timothy Walter, Aspen Institute Rural Economic Policy Program, 1997. This 10-page guide lists foundation and federal funding programs targeted to Internet access. The 199€ edition is available free on-line at www.aspeninst.org/rural/

Funding for Information Technologies. Foundation Center, 1997.

Telemedicine Research Center (http://tie.telemed.org)

The Telemedicine Research Center, an Oregon-based not-for-profit research organization, provides an on-line source of information called the Telemedicine Information Exchange (TIE). TIE is a comprehensive database of information on telemedicine that includes a bibliographic database of more than 1,000 citations from a variety of sources, information on the funding availability and agencies for telemedicine, and a list of more than 100 telemedicine projects in the United States, including descriptions, contact names, funding sources, and technology used.

CURRENT NATIVE AMERICAN TECHNOLOGY AND TELECOMMUNICATIONS PROJECTS (1994 TO PRESENT)

EDUCATION

Access Native America (Bureau of Indian Affairs)

The goal of this project is to connect all schools and regional offices under the Bureau of Indian Affairs (BIA) jurisdiction by the year 2000. The Office of Indian Education Programs will be facilitating the procurement and installation of all the infrastructure necessary to connect each BIA school to the Department of Interior's Internet backbone ("DOInet"). Connectivity in the classroom will:

- improve education management through the use of new software and interactive tools; and
- improve and expand education applications through the establishment of partnerships with companies and nonprofit organizations to provide the latest innovative ideas and technology in the classroom.

Out of the 185 schools supported by the BIA, 76 are connected to the Internet and 104 are Internet-ready. (Source: "Access Native America" brochure and personal interviews with William Mehojah, Deputy Director, Office of Indian Programs, Bureau of Indian Affairs, 1998).

All-Nations Alliance for Minority Participation Grant (AMP)

This is a partnership between Salish Kootenai College, Montana State University, and the American Indian Higher Education Consortium (AIHEC). The project's main objective is to create new retention and education programs to reverse the dropout/stopout rates of American Indian students by: creating a telecommunications network to share classes among alliance schools; easing the transfer credit process; implementing better support services to keep students in school; asking businesses, industries, foundations, and professional organizations to take a more active role in science, engineering, and mathematics education for minorities; and beginning a mentor program. (Source: The Ethnic Newswatch, Char-Koosta News, 1994).

American Indian Higher Education Consortium (AIHEC) Distance Learning Network

The AIHEC Telecommunications Project is comprised of 29 tribal and BIA-controlled community colleges and universities located in 12 states. Of these 29 colleges, 25 are located on tribal nations in remote areas of the country. The purpose of the project was to develop and implement a plan to connect the colleges in a seamless telecommunications system to share limited educational resources. After an extensive study of all available telecommunications technology, it was determined that satellite technology was the most cost-effective. Once operational, the AIHEC-Distance Learning Network will be used to deliver and receive telecourses, videoconferences, and in-service training for faculty and staff. In addition, it will be available for the various federal, state, and tribal employees to use. (Source: materials provided by Native American Public Telecommunications, 1997).

Diné College: The Navajo Learning Network Project

This project establishes educational and community activities on a single virtual campus linking educational institutions being developed by the Navajo Nation. The Navajo Learning Network project team will provide training and will work closely with faculty to develop effective strategies for utilizing information technology as a teaching and learning tool in a way that is sensitive to the learning styles of Navajo schoolchildren. (Source: National Science Foundation 1995 Awards listing).

Electronic Pathways: Native American Community Alliance and Technology Project

Funded by NASA, this project targets Native American communities and schools in Arizona/New Mexico, South Dakota, and Oklahoma. It will assist schools and communities to develop or expand local Community Alliances whose purpose is to improve upon and continue reforms in mathematics, science, and technology. The project will assist the Alliances to engage in dialogue and to develop action plans to further community-school interactions and involvement in education. The project is also developing a database of success stories and examples where technology has been used in Native American communities and schools.

The three communities participating in this pilot project are: Tahlequah, OK (Woodall School, Northeastern Oklahoma State University); Kyle, SD (Little Wound School, American Horse School, Oglala Lakota College); and Shiprock, NM (Central Consolidated School District #22, Navajo Community College, Navajo Department of Education). (Source: Electronic Pathways,/hanksville.phast.umass.edu/defs/independent/ElecPath/elecpath.html, 1998).

Educational Native American Network (ENAN)

The ENAN project started almost seven years ago through the funding of the Bureau of Indian Affairs/Office of Indian Education Programs. It was the first computer network devoted to American Indian Education and is often called the "Grandfather of Indian Networking."

When it began, ENAN was a small pilot project designed to network Western New Mexico and Eastern Arizona BIA/OIEP schools. It was known as the Eastern Navajo Area Network, and was designed to foster communications between BIA/OIEP teachers, students, and administrators.

Today, ENAN has expanded its scope as the Educational Native American Network and has grown into an extensive network that links together teachers, students, administrators, and parents. It provides full Internet connection to more than 100 BIA/OIEP schools (with SLIP service available on demand), and will soon begin ISDN service to selected schools to provide TCP/IP connection to reservation sites that otherwise could not afford such service.

In addition, ENAN is a participating member in the Four Directions Project, which is a U.S. Department of Education Challenge Grant. ENAN's role is to provide technical support to participant schools regarding Windows NT.

Four Directions (4D) Project (BIA and National Museum of the American Indian (NMAI))

Currently in its collaborative planning and development phase, the "Four Directions (4D) Program" aims to bring together the technology and resources of both the BIA Office of Indian Education and the NMAI. Two scenarios are currently under discussion. One is the development of "virtual tours" of the NMAI's exhibit facility in Manhattan, NY (the George Gustav Heye Center) on the NMAI Web page. The second is the development of a "virtual museum" utilizing the cultural materials of the NMAI and the community. In essence, the 4D is a BIA project that will electronically link Indian schools using the Internet and provide new technology opportunities to Native American students in eight states. The 4D home page is challenge.ukans.edu. (Source: E-mail correspondence September 21, 1998, from Keevin Lewis, Community Services Coordinator for NMAI in Washington, DC).

NASA Tri-State Education Initiative

NASA's Stennis Space Center in Mississippi will work in partnership with the Mississippi Choctaw Tribal Council to enhance existing mathematics, science, and technology education programs and to create new vocational and technical training programs. NASA will establish a teacher enhancement center at the Choctaw reservation, and both NASA and the Mississippi Band of Choctaw will actively conduct education activities within Mississippi and throughout parts of Alabama and Tennessee. (Source: NASA press release, May 5, 1995).

National Indian Telecommunications Institute (NITI): Native American Mathematics and Science Technology Program

NITI will provide technical, educational, and personnel support in Native American rural and reservation communities and schools to improve K-12 mathematics and science education through access to the Internet. Development of curriculum will be standards-based, collaborative, and sensitive to Native American learning styles and culture. A variety of databases and electronic bulletin boards will be established for access by other Native American schools and communities. (Source: National Science Foundation 1995 Awards listing).

Native American Educational Services (NAES) College, Chicago, IL

NAES College created a telecommunications network linking its central facility in Chicago with two urban Native American campuses in Minneapolis and Chicago, and with the Fort Peck Reservation in Montana and the Menominee Reservation in Wisconsin. The network enables distance learning among the four campuses and provides students and teachers with access to the College's vast Native American library and special collections in Indian law, public policy, child and family issues, environment, and history. NAES is the only private Indian-controlled college in the United States offering an academic program that is community-based and culturally relevant to Native communities. (Source: "TIIAP Brings Connectivity to American Indian and Alaska Native Communities," U.S. Department of Commerce, 1998).

Native American Public Telecommunications (NAPT): Tribal Information Infrastructure Project

This planning project will create a national demonstration project for American Indian tribal governments to participate in the National Information Infrastructure (NII). Objectives include: improve access by tribal governments to the NII; interconnect tribal governments and link them to federal and state governments and agencies; increase educational opportunities through access to the NII; enhance the education of children through access to remote resources and specialized personnel; and identify training resources necessary to ensure full utilization after interconnection. Six tribes form the core group for this project: Southern Ute Tribe, Eastern Band of Cherokee Indians, Standing Rock Sioux Tribe, Sisseton-Wahpeton Sioux Tribe, Campo Band of Mission Indians, and the Turtle Mountain Chippewa Tribe. *The project has been completed, and a final report on its results can be found in the source cited for this project description or at www.nativetelecom.org.* (Source: Tribal Information Infrastructure Planning Project: Final Report, December 1996).

Navajo Education Technology Consortium (NETC)

In 1997, NETC was awarded a five-year, $7.6 million Challenge Innovative Technology Grant to improve the use of technology through professional development throughout the Navajo Nation. Its main goal and activity is to provide training to educators in the consortium's school systems, primarily by emphasizing the use of technology to support the academic standards that are required by all school systems. NETC is a consortium composed of K-12 public school superintendents, selected BIA or

Contract Schools, local and state educational organizations, and higher education institutions on or near the Navajo Nation in Arizona, New Mexico, and Utah. (Source: e-mail message from Gloria Hale-Showalter, Secretary/Treasurer of NETC and Assistant Superintendent, Window Rock Unified School District, Fort Defiance, Kayenta, Arizona. E-mail: /gloriahs@wrusd8.k12.az.us).

Stone Child College (on behalf of AIHEC): Networking Infrastructure for Native American Education AIHEC Consortium

This project will provide new networking and training programs for both video and data networks to improve science and mathematics education for American Indians. The project will include the 29 AIHEC institutions and will result in the development of an Associate's Degree Program in Telecommunications, which will provide support to expand Native American implementation of technology. (Source: National Science Foundation 1995 Awards listing.)

United Tribes Technical College--Connecting North Dakota's Tribal Colleges: The Internet Comes to Indian Country

This project will provide educational activities included on a connections grant to link five tribally controlled community colleges in North Dakota to the Internet. The colleges will work with North Dakota's sophisticated higher education network to accomplish the connection, and will receive training from Electronic Pathways, an organization devoted to helping American Indians connect to the Internet. (Source: National Science Foundation 1995 Awards listing).

COMMUNITY NETWORKING

Utah - Colorado - Arizona - New Mexico Rural Systemic Initiative (UCAN/RSI)

The UCAN/RSI, together with New Mexico Highlands University and six coalitions, will provide selected rural school districts catalytic support for comprehensive programs that will broaden the impact, accelerate the pace, and increase the effectiveness of improvements in science, mathematics, and technology. The programs will include significant involvement of the local communities in the design and implementation of change as well as in the sustaining of that change. These changes will be conducted by integrating cultural traditions with science, mathematics, and technology education; local economic development; communication; and access to resources. Coalition members: New Mexico Counties and Schools Coalition; Colorado Plateau Coalition; Ute Tribes/Four Corners Coalition; New Mexico Tribal Coalition; Southern Colorado Coalition; and Arizona Tribal Coalition. (Source: UCAN/RSI brochure).

American Indian Radio on Satellite (AIROS)

The AIROS network is a national distribution system, seven days a week, for Native programming to tribal communities and to general audiences through Native American and other public radio stations. Programs include: "Native America Calling," "Alter*Native Voices," "Different Drums," "Signals," and "Windsongs." (Source: materials provided by Native American Public Telecommunications, 1997).

Cherokee Nation Telecommunications Activities, Oklahoma

In one project, the Cherokee Nation developed a financial information system for the Department of the Interior's Office of Self-Governance. In another project, in partnership with NASA Science Internet, the Sequoyah High School and W.W. Keeler Complex will be connected to the Internet for scientific and educational use. In the future, the Cherokee Nation is planning to link all Cherokee Nation offices. (Source: U.S. Congress, Office of Technology Assessment, *Telecommunications Technology and Native Americans: Opportunities and Challenges*, 1995).

Confederated Tribes of the Chehalis Telecommunications Committee, Oakville, Washington

The Confederated Tribes of the Chehalis formed the five-person Communication, Information, and Technology Committee in 1993, after a series of demonstrations and training from the U.S. Department of Agriculture (USDA) Extension Indian Reservation Program. Spurred by this activity, the Affiliated Tribes of Northwest Indians (ATNI) in Portland recently created a similar committee, the Telecommunications and Technology Committee. ATNI has 50 member tribes from Montana, Oregon, Washington, Idaho, and Alaska (Native villages). (Source: U.S. Congress, Office of Technology Assessment, *Telecommunications Technology and Native Americans: Opportunities and Challenges*, 1995).

Council of Athabascan Tribal Governments, Fort Yukon, Alaska

This project brings Internet access to 11 remote Alaskan villages, as well as technical support and training. (Source: "TIIAP Brings Connectivity to American Indian and Alaska Native Communities," U.S. Department of Commerce, 1998).

Diné College (NCC), Tsaile, AZ

Diné College created a virtual campus by connecting the seven Diné College campuses to the Internet via wireless technology. The network enhances student, teacher, and citizen access to a wide range of services, including education, economic development, health, and government services. The

TIIAP project is the foundation for a long-term telecommunications and information technology development plan for the Navajo Nation. (Source: "TIIAP Brings Connectivity to American Indian and Alaska Native Communities," U.S. Department of Commerce, 1998).

EPA Office of Water Connecting Tribes

EPA's Region 5 (Chicago Office) is working with tribal representatives to place 184 surplus 486 computers with Region 5 Tribes via BIA, loaded with new, free Internet access software developed by EPA Region 5 SRF program. Contact : Claudia Johnson, EPA 312-886-6108. (Source: "Electronic Communications Project/Activities in Indian Country," www.muspin.gsfc.nasa.gov, 1997).

Fort Berthold Community College, New Town, ND

The college is developing a reservation-wide telecommunications system to provide education, culture, and training for the Three Affiliated Tribes (Mandan, Hidatsa, and Arikara Nations). (Source: "TIIAP Brings Connectivity to American Indian and Alaska Native Communities," U.S. Department of Commerce, 1998).

Indian Circle (www.indiancircle.com)

Indian Circle was created and is maintained by the Seminole Tribe of Florida. It is a web ring connecting the Internet web pages of federally recognized American Indian Tribes. (A web ring is a way to group together sites by linking them together in a circle, or ring.) From Indian Circle, one will be able to reach most American Indian Tribes on the Internet. Currently, there are approximately 100 active links to official tribal Web sites on Indian Circle. (Source: www.indiancircle.com and personal interviews).

IndianNet - a project of Native American Public Telecommunications (NAPT) and Americans for Indian Opportunity (AIO)

IndianNet, founded in 1990, is the first national computer network to provide civic information useful to American Indians and Alaskan Natives. This information is provided to anyone with access to a computer, modem, telecommunications software, and telephone. IndianNet services are also available via the Internet. When fully developed, IndianNet will be multipurpose, acting as a clearinghouse for federal information and opportunities that pertain to Indians and creating a setting for tribes to develop profiles about themselves. (Source: Americans for Indian Opportunity literature).

Internet and E-mail Environmental Education Training Project

The Environmental Protection Agency (EPA) sponsors e-mail and Internet training for tribes located throughout the Colorado Plateau. A total of four courses was offered December 1996-May 1997; two at Northern Arizona University, one at NCC Shiprock, and one at Southwest Indian Polytechnic Institute (SIPI). The courses were free to any tribal environmental, natural resource, health, or related government official, as well as tribal environmental grassroots organizations. Contact Person: Michelle Biehl, NAU, (520)-556-7471, ext. 231. (Source: "Electronic Communications Projects/activities in Indian Country," www.muspin.gsfc.nasa.gov, 1997).

La Plaza Telecommunity Foundation, Inc., Taos, NM

La Plaza is demonstrating a telecommunications network that is bringing Internet access to the citizens of this rural community, including Taos Pueblo. Citizens are able to access important health care, government, education, and economic development information through public access computers in the community. The project is also providing culturally relevant information on self-care for diabetes, which is prevalent in Native American populations. (Source: "TIIAP Brings Connectivity to American Indian and Alaska Native Communities," U.S. Department of Commerce, 1997).

Lawrence Livermore Laboratory Field Office - Indian Issues Points of Contact Communications Project Report

This project supports the informational needs of the Department of Energy (DOE) Indian Issues Points of Contact (POCs) through the application of current electronic telecommunications technologies. These technologies include: electronic mail (e-mail), automated distribution e-mail listservers, and the implementation of the World Wide Web information resources. The project encompasses two phases. The first phase involves the improvement of communications pathways between DOE headquarters, in Washington DC, and the DOE Indian Issues POCs, located at the various DOE Field Offices throughout the United States. The second phase deals with improvement of communication between the POCs and their respective tribal contacts by compiling information on obstacles and remedying them with the application of current telecommunications technologies. Phase two will also continue maintenance and updates of implementations put in place during phase one.

The project is also intended to model a 'piggyback' approach to the creation of information services. In the piggyback approach, costs are minimized throughout use of existing infrastructure, rather than the purchase of dedicated equipment. In the POC Communications Project, all Internet information services are contributed by DOE offices that have surplus computing resources. This approach results in a great cost savings over typical approaches to the creation of Internet information services. Contact: Steve Grey 505-386-5120 or grey1@llnl.gov. (Source: "Electronic Communications Projects/activities in Indian Country," www.muspin.gsfc.nasa.gov, 1997).

Minneapolis American Indian Center, Minneapolis, MN

The goal of this project is to create a network to promote access to a wide range of social services for American Indians living in an urban area, while also developing communication capacities within the Twin Cities American Indian community, the larger

Twin Cities community, and selected tribal governments. (Source: "TIIAP Brings Connectivity to American Indian and Alaska Native Communities," U.S. Department of Commerce, 1998).

Native American Public Telecommunications (NAPT): Tribal Information Infrastructure Project

This planning project will create a national demonstration project for American Indian tribal governments to participate in the National Information Infrastructure (NII), the national telecommunications superhighway. Objectives include: improve access by tribal governments to the national communication and information infrastructure; interconnect tribal governments and link them to federal and state governments and agencies; increase educational opportunities through access to the information superhighway; enhance the education of children through access to remote resources and specialized personnel; and identify training resources necessary to ensure full utilization after interconnection. Six tribes form the core group for this project: Southern Ute Tribe, Eastern Band of Cherokee Indians, Standing Rock Sioux Tribe, Sisseton-Wahpeton Sioux Tribe, Campo Band of Mission Indians and the Turtle Mountain Chippewa Tribe. *The project has since been completed, and a final report on its results can be found in the source cited for this project description or at www.nativetelecom.org.* (Source: Tribal Information Infrastructure Planning Project: Final Report, December 1996).

Navajo Nation Telecommunications Partnerships and Planning, New Mexico, Arizona, and Utah

Individual projects include Internet access through the Crownpoint Pilot Project and the Information Technology Office's development of the Technology and Information Resource Plan. Partnerships to develop telecommunications human resources and infrastructure are forming with Crownpoint Institute of Technology, Navajo Community College, National Aeronautics and Space Administration, Los Alamos National Laboratory, Lawrence Livermore National Laboratory, University of New Mexico, and Northern Arizona University, among others. (Source: U.S. Congress, Office of Technology Assessment, *Telecommunications Technology and Native Americans: Opportunities and Challenges*, 1995).

Office of Surface Mining (OSM) Connecting Tribes

OSM has currently connected the Hopi offices in Flagstaff to the Department of the Interior's Wide Area Network (DOINET) via 56 Kbps leased lines from US West. There are additional plans to connect the reservation offices at Kykotsmovi and another effort underway to connect the Navajo at Tuba City, Window Rock, and Shiprock. There also is interest in the Crow Tribe in Southern Montana. These connections are to an IP network and/or the Internet, and are at least 56 Kbps connections. Cisco routers are used to connect their LANs to the DOINET and to OSMNET. The project would be interested in sharing circuits and/or equipment. Contact Person: Mike Casey, DOI (202) 208-2577. (Source: "Electronic Communications Projects/activities in Indian Country," www.muspin.gsfc.nasa.gov, 1997).

Oneida Nation Telecommunications Infrastructure Development, Oneida, New York

Includes fiberoptic wiring to government offices, community centers, and new houses. Internet access is provided by NYSERNet, Inc. First tribal home page (http://nysernet.org/oneida) tells the story of culture and community development. (Source: materials provided by Native American Public Telecommunications, 1997).

Rural Development Council Telecommunications Training

USDA is sponsoring rural development councils in all of the Western states. These councils have sponsored telecommunications training. USDA is coordinating these programs with EPA's Office of Regional Operations and State/Local Relations. Seventy-five percent of funding is from federal sources, 25 from States. Contact Person: Paul Guthrie, EPA (202) 260-4071. (Source: "Electronic Communications Projects/activities in Indian Country," www.muspin.gsfc.nasa.gov, 1997).

Southern Ute Indian Tribe, Ignacio, CO

The Tribe has created a community network providing Internet access to the Ignacio Community (Southern Ute Tribe, Ignacio Public Schools, and Fort Lewis College). After experiencing the benefits of information technology, the community is contributing ongoing costs to continue the project. In addition, community members are purchasing computers at an increased rate, with the Tribe offering special rates to members who purchase home computers. The project has enhanced tribal activities, has created new partnerships among various organizations in the Ignacio Community, and will serve as a model for other Native American tribes and their communities. (Source: "TIIAP Brings Connectivity to American Indian and Alaska Native Communities," U.S. Department of Commerce, 1998).

White Mountain Apache Tribe, Whiteriver, AZ

This project has brought the vast resources of the Internet to the reservation for the first time. The resulting community-wide network enhances student, teacher, and citizen access to education, economic development, health, and government service information. The Tribe has worked with the Arizona Public Service Company and the local ISP to secure a toll-free local connection to the Internet. In addition, a T-1 line is being run out to the reservation. (Source: "TIIAP Brings Connectivity to American Indian and Alaska Native Communities," U.S. Department of Commerce, 1998).

ENVIRONMENT

The Colorado Plateau Information Network (CPIN)

This Internet site was developed and is currently maintained by the Colorado Plateau Field Station (a unit of the U.S. Geological Survey Forest and Rangeland Ecosystem Science Center in Corvallis, OR) for the purpose of developing, distributing, and archiving geo-referenced and biological research data throughout the Colorado Plateau. It is part of a collaborative effort involving the EPA and the National Park Service (NPS), and its mission is to provide information concerning the Colorado Plateau ecosystem to researchers, natural resource managers, collaborative planning organizations, Native American tribal members, policy makers, graduate students, and interested members of the public. (Source: www.nbs.nau.edu).

Columbia River Inter-Tribal Fish Commission, Portland, OR

A telecommunications network was established linking the Yakima, Warm Springs, Umatilla, and Nez Perce Tribes. The network enhances the Tribes' ability to manage fisheries in the Columbia River Basin. (Source: "TIIAP Brings Connectivity to American Indian and Alaska Native Communities," U.S. Department of Commerce, 1998).

EPA Region 1 Tribal Environmental Programs On-line

Each of the nine tribes located in EPA Region 1 have electronic communications capability with EPA and have access to the Internet. The computers and access development were made possible through EPA's General Assistance Program (GAP) funds. The GAP is used specifically for building the capacity of tribal government environmental programs. The GAP funds are for a minimum of $75,000. At this point, enough funds are not available to provide each tribe with assistance. Contact Person: Jim Sappier (617) 565-3935. (Source: "Electronic Communications Projects/activities in Indian Country," www.muspin.gsfc.nasa.gov, 1997).

Mni Sose Intertribal Water Rights Coalition, Inc., Rapid City, SD

The Coalition designed a telecommunications network linking 23 tribes in Montana, South Dakota, North Dakota, Kansas, and Nebraska. The network provides greater communications among the Tribes, enhances access to government information, and assists with managing natural resources on the tribal lands. The wide area network has reduced the Tribes' isolation and made it possible for them to work cooperatively with other entities in developing water resources in the Missouri River Basin. The project has had the added benefit of bringing together the tribal leaders through a series of partnership-building meetings. All active participants in the project are either enrolled members of a Tribe, live in the reservation communities, or work extensively with Native Americans. Using computer-aided research, the Tribes have identified several environmental problems in the Missouri River Basin. For the first time, Tribes have been able to seek information about the nature, cause, and effect of environmental problems, and computer technology has allowed the Tribes to access a number of agencies involved in environmental issues. (Source: "TIIAP Brings Connectivity to American Indian and Alaska Native Communities," U.S. Department of Commerce, 1997).

GEOGRAPHIC INFORMATION SYSTEMS (GIS) AND GLOBAL POSITIONING SATELLITE SYSTEMS (GPS)

According to the Intertribal GIS Council, over 150 tribes currently use GIS and GPS information today. GIS is a computer-based technology used for sophisticated mapping and land or data management. Beyond the basic topographical sites shown on maps, GIS has the ability to connect standard map features with cultural, historic, scientific, or other related information in whatever combination appropriate for the user. These systems together are being used by tribes with a land and resource base in need of management or with intentions to reclaim formerly held lands.

Three main organizations provide support to tribes working with GIS and GPS.

1. The **Geographic Data Service Center (GDSC)** in Lakewood, CO, is a part of the BIA and serves as a central processing unit for information, training, and service to tribes regarding GIS and GPS.
2. The **Intertribal GIS Council** was formed by 50 tribes who run their own GIS programs to serve as a forum for sharing knowledge, data, experience, and concerns. It maintains a database of its members and conference participants. For more detailed information on the types of projects GIS Council members are conducting, contact Beth Wenstrom, IGC Board Member at 916/566-7520.
3. **ESRI** is a company that produces GIS software and, through the ESRI Conservation Program (ECP), supports conservation groups and related nonprofit local, international, and indigenous organizations in acquiring, learning, and using GIS tools and methods. ECP has a particular focus on providing appropriate levels of technology for locally sustainable programs. Its goal is to build permanent, locally based support structures that

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provide ongoing evolutionary growth in GIS skills. For more information, contact Charles Convess at 909/793-2853, ext. 2488.

Specific projects include:

Haskell Indian Nations University GIS Program and Laboratory

Haskell Indian Nations University, in partnership with the U.S. Geological Survey (USGS), BIA, and EPA, has developed a GIS program on the Haskell Campus in Lawrence, KS. The purpose of the program is to provide GIS educational opportunities and work experience to American Indian and Alaskan Native students at Haskell and to provide educational outreach and GIS application support to tribes. The GIS program at Haskell includes:

- teaching introductory courses in GIS technology;
- continuous maintenance and development of a GIS laboratory that utilizes advanced computer technology, which can be easily accessed by students and by tribes; and
- providing practical work experience for students by having them participate in tribal, BIA, USGS, and other federal-agency GIS projects.

The Haskell GIS program is increasing employment opportunities and providing students with valuable skills that they can take back to their respective tribes or villages. (Source: Haskell Indian Nations University, www.haskell.edu, 1999).

The Pueblo of Jemez - Los Alamos Pueblo Project (LAPP)

Working with the DOE and the Los Alamos National Laboratory, as well as other agencies/institutions, the Jemez LAPP Program utilizes computer-aided-drafting (CAD), an advanced GIS, and 12-channel GPS to record, quantify, and analyze natural and cultural resources that are of significance to the People of the Pueblo of Jemez. The knowledge gained enables the Tribe to effectively identify and assess any adverse impacts to the significant resources that may be connected to past, present, and future activities of the Los Alamos National Laboratory. In addition, it equips tribal leaders with a detailed, visually oriented database that permits effective consultation, monitoring, and management (Source: "Native GIS," www.cycor.ca/neto/natvgis.htm, 1997 - no longer active).

LAW ENFORCEMENT

Dakota Territory Chairmen's Council, Eagle Butte, SD

The Dakota Territory Chairmen's Council will launch an inter-tribal program to address the growing problem of domestic violence. Under the direction of an attorney and a project coordinator hired with grant funds, and in collaboration with nonprofit service organizations, the Chairmen's Council and its 16 member tribes will work together to develop uniform laws and policies for all the tribes regarding the mandatory arrest and prosecution of primary aggressors in domestic violence cases. The project also will develop and implement a computer network system linking all 16 member tribes to assist tribal police, prosecutors, and courts in handling domestic violence offenders and to assist service organizations in protecting victims. In addition, the project will develop uniform policies regarding inter-jurisdictional enforcement of protection orders; provide training and develop training materials for tribal law enforcement officers, tribal prosecutors, and tribal judges; and coordinate community responses to domestic violence. (Source: U.S. Department of Justice, Office of Justice Programs Violence Against Women Grants Office, www.ojp.usdoj.gov, 1997 Project Summaries).

Hopi Tribe, Kykotsmovi, AZ

The Hopi Family Protection Initiative is part of an overall community process that will implement an effective, comprehensive response to violence against native women. This project will establish a centralized, computerized registry to monitor and track violence against native women, create a central response unit to effectively and immediately respond to the needs of battered women, and build linkages with service providers within the Hopi Tribe and with other tribes, counties, and the state. This proposal sets out a comprehensive plan to implement the Hopi Family Relations Ordinance passed in May 1996. (Source: U.S. Department of Justice, Office of Justice Programs Violence Against Women Grants Office, www.ojp.usdoj.gov, 1997 Project Summaries).

The Oglala Lakota Nation of Pine Ridge, SD

The Oglala Lakota Nation will create a collaborative and coordinated system to respond to domestic violence on a reservation that spans 7,000 square miles in three counties of South Dakota. They will develop a central registry for protection orders and a centralized computer information system of offenders for use by law enforcement, probation, and court officers. The tribe will hire two law enforcement officers for the eastern and western substations on the reservation who will specialize in responding to domestic violence, two probation officers to supervise batterers, and two advocates to assist victims and coordinate with law enforcement to ensure victim safety. Advocates also will assist in developing and implementing policies, protocols, and procedures to guide the tribal and criminal justice systems' response to domestic violence. (Source: U.S. Department of Justice, Office of Justice Programs Violence Against Women Grants Office, www.ojp.usdoj.gov, 1997 Project Summaries).

The Osage Nation of Pawhuska, Osage, OK

Through this grant, the Osage Nation will develop a computerized information tracking system that will provide law enforcement agencies throughout Osage County with information about perpetrators of domestic violence and their victims. The Osage Nation's prosecutors, court personnel, social services workers, and parole and probation officers will also have access to this information. This will allow all service providers in the Osage Nation's criminal justice system to have information that will enable them to approach each domestic violence case in the most appropriate manner, thereby increasing the probability that the offender will be held accountable and the victim's safety will be assured. (Source: U.S. Department of Justice, Office of Justice Programs Violence Against Women Grants Office, www.ojp.usdoj.gov, 1997 Project Summaries).

Sac and Fox Nation, Stroud, OK

Through this grant, the Sac and Fox Nation will develop a computerized information tracking system that will provide criminal justice professionals and the judicial system of the Sac and Fox Nation with information about perpetrators of domestic violence and their victims. This will allow service providers of the Sac and Fox Nation's criminal justice system to have information which will enable them to approach each domestic violence case in the most appropriate manner, thereby increasing the probability that the offender will be held accountable and the victim will be provided with safety. (Source: U.S. Department of Justice, Office of Justice Programs Violence Against Women Grants Office, www.ojp.usdoj.gov, 1997 Project Summaries).

LIBRARY AND MUSEUM SERVICES

Four Directions (4D) Project (BIA and National Museum of the American Indian (NMAI))

Currently in its collaborative planning and development phase, the "Four Directions (4D)" Program aims to bring together the technology and resources of both the BIA Office of Indian Education and the NMAI. Two scenarios are currently under discussion. One is the development of "virtual tours" of the NMAI's exhibit facility in Manhattan, NY (the George Gustav Heye Center) on the NMAI web page. The second is the development of a "virtual museum" utilizing the cultural materials of the NMAI and the community. In essence, the 4D is a BIA project that will electronically link Indian schools using the Internet and provide new technology opportunities to Native American students in eight states. The 4D home page is http://challenge.ukans.edu. (Source: E-mail correspondence September 21, 1998, from Keevin Lewis, Community Services Coordinator for NMAI in Washington, DC).

Digital Desert Library, Santa Clara Day School, Española, NM

This project is a partnership of the Santa Clara Day School, New Mexico State University, and the Smithsonian Institution's National Museum of Natural History Seeds of Change Program. The project will support the development of the Day School's Schoolyard Habitat and Community Garden through the integration of technology into the curriculum created around the garden. Each partner will provide the Day School with assistance in the areas of video production, electronic mail, Internet access, digital database development, and laser disc technology. The result will be a living laboratory and microcosm of the important aspects of Santa Clara Pueblo that exists for the Day School students as an interactive educational tool and electronic resource. (Source: materials provided by Robin Rodar, Santa Clara Day School, and http://horizon.nmsu.edu/ddl, 1999).

Oracle Promise (partnership with Los Alamos National Laboratory), Santa Clara Day School, Española, NM

The Santa Clara Day School has received network computers through the Oracle's Promise, a philanthropic initiative of Oracle Corporation chartered with providing network computers to economically challenged, disenfranchised public schools. Oracle's Promise was introduced on June 24, 1997, when Oracle Corporation announced a $100 million donation to be used for providing network computer access to every child in America. The donation was made in support of America's Promise-The Alliance for Youth, a multiyear, national campaign created to further the mission and goals of the Presidents' Summit for America's Future. (Source: www.oracle.com/promise, 1999).

Santa Clara Pueblo Community Library, Española, NM

The Santa Clara Community Library received funding in 1999 from the National Institute of Library and Museum Services Native American Library Services Program to conduct a two-year project that will:

- facilitate access by the Santa Fe Indian School and Santa Clara Day School libraries and their students to the Santa Clara Community Library's extensive book photo and archive collection of general Indian and Pueblo-specific materials through the establishment of an Inter-library loan system (via Athena software).
- enhance collection for, and increase outreach to, underserved groups in the community (preschool children, working adults, GED students, senior citizens, and handicapped individuals, etc.).
- provide computer and Internet training classes to the community.
- develop the Santa Clara Community Library's capacity as a multimedia resource center for the community and tribal government by establishing tribal archives of documents, historical papers,

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correspondence, photos, etc. These materials will be organized into a rotating exhibit of 300 works to be installed at the library and the Puye Cliffs historic landmark with the objective of educating visitors and community members about the importance of protecting ancient dwellings and culture.

(Source: materials provided by Robin Rodar, Santa Clara Day School, 1999).

1998 Native American Library Services Program Grants (Institute of Library and Museum Services)

This program provides small grants for core library operations of tribes and Alaska Native villages, technical assistance for these libraries, and enhancement grants to promote innovative practices in libraries serving Native Americans and Alaskan Native villages. More than 200 tribes and Native villages received funding in 1998. The Native Hawaiian Library Services grant provides a single grant to an organization that primarily serves and represents Native Hawaiians. Both grant programs have provided grants to libraries for projects involving the use of multimedia technologies and computer training. (Source: www.ilms.fed.us, 1999)

TELEMEDICINE

Alamo Navajo School Board, Magdalena, NM

The School Board is developing two-way, interactive videoconferencing to connect the Alamo Health Center and the Indian Health Service's Albuquerque Indian Hospital to provide diagnostic services. (Source: "TIIAP Brings Connectivity to American Indian and Alaska Native Communities," U.S. Department of Commerce, 1998).

Alaska Telemedicine Project

There are currently seven radiological sites participating in the Alaska Telemedicine Project through Providence Health Systems in Alaska (Cordova, Homer, Dutch Harbor, Kodiak, Valdez, Nome, and Seward). The Alaska Telemedicine Informatics Project will provide e-mail, conferencing, and the ability to transfer quicktime movies and digital images using FirstClass Software. This software will be distributed to all health care professionals in the state for free. AT&T Alascom is supporting this project through the use of their statewide x.25 network and ATU Telecommunications is supporting it through the use of local dial-in lines, ISDN modem links, and a POP connection to partners Providence Alaska Medical Center and KAKM-TV (PBS). This system currently has 400 users.

Future projects include working relationships with NASA to provide health care for rural Alaska with a home health nursing wireless demonstration project; with the military for beta testing technologies; and with Apple Computer and Tetherless Communications for the exploration of various wireless technologies and applications to ATP partners in the Russian Far East and the Circumpolar region. The Alaska Telemedicine Project is interested in partnering with anyone who has narrow bandwidth constraints and interests. (Source: Telemedicine Research Center, http://tie.telemed.org/TIEmap.html).

Distance Delivery Consortium, Bethel, AK

The Distance Delivery Consortium has a hospital in Bethel that serves a region the size of Ohio, with 52 surrounding villages that are served by community health aides who communicate with doctors by phone. They have spent the first year of a three-year grant providing health aides in these villages with e-mail and a multimedia computer so they may become familiar with computer technology. (Source: Telemedicine Research Center, http://tie.telemed.org/TIEmap.html).

The North Slope Borough (NSB)-AuroraNet Project, Barrow, AK

The NSB-AuroraNet project is opening up existing telecommunications infrastructure for multiple uses, such as providing greater opportunity for Borough residents (75% Inupiat, Northern Eskimo) to better access health care information through distance delivery of medical information. The network, a partnership of the NSB, NSB School District, Ilisagvik College, and the Arctic Slope Native Association, will connect eight rural, isolated North Slope communities to the 14-bed hospital in Barrow. (Source: "TIIAP Brings Connectivity to American Indian and Alaska Native Communities," U.S. Department of Commerce, 1998).

Northwest Portland Area Indian Health Board, OR

The Health Board is developing the *Circle of Health: Information Infrastructure for the Northwest Tribes* to facilitate disease surveillance and the collection and analysis of epidemiology information in geographically remote tribal communities. The project connects eight tribal health facilities to the Indian Health Service, the Washington State Network, and the Internet, and allows Washington State tribes to use electronic communicable disease reporting systems. (Source: "TIIAP Brings Connectivity to American Indian and Alaska Native Communities," U.S. Department of Commerce, 1998).

Oklahoma Medical Information Network, Center for Telemedicine

The Oklahoma Medical Information Network is a pilot project between three rural facilities and an urban center. The Center for Telemedicine at the University of Oklahoma Health Sciences Center is responsible

for the project connecting the Choctaw Memorial Hospital (rural hospital), Konawa Health Clinic (rural clinic), the Carl Albert Indian Hospital (rural Indian hospital), and the Veterans Administration Hospital in Oklahoma City. The services currently provided are primary reading teleradiology, emergency reading teleradiology, remote diabetic retinopathy screening, and information services. (Source: Telemedicine Research Center, http://tie.telemed.org/TIEmap.html).

Oglala Sioux Tribe, Pine Ridge Reservation

The tribe is developing a digital wireless network for home health care. The network uses a paging system to coordinate responses from health services and emergency services to high-risk patients. (Source: "TIIAP Brings Connectivity to American Indian and Alaska Native Communities," U.S. Department of Commerce, 1998).

Internet Training for Rural Alaska Hospitals

Because of the extreme isolation of health care providers working in Alaska rural areas and the rapid rate of turnover of the professional staff, the Pacific Northwest Regional Medical Library plans to fund a subcontract with the University of Alaska at Anchorage to provide Grateful Med and Internet training to 18 rural villages: Barrow, Nome, Bethel, Kotzebue, Dillingham, Kodiak, Soldotna, Homer, Valdez, Cordova, Juneau, Sitka, Dutch Harbor, Haines/Skagwag, St. Paul, Ketchikan, and Kake. Thirteen of these sites were equipped and trained for Grateful Med searching through two previous National Library of Medicine (NLM) grants. The remaining five hospitals, which were not participants in earlier projects, expressed interest in Grateful Med and Internet training. A needs assessment and evaluation will be conducted for each hospital. Site visits will be conducted for all sites, and Grateful Med clinics for site personnel and clinicians from remote village clinic providers. The project also will include outreach visits to local health care providers not affiliated with the site facility. Technical assistance will be provided on an as-needed basis. For more information, access the NLM site at: www.nlm.nih.gov or the Grateful Med site at: http://igm.nlm.nih.gov. (Source: "Electronic Communications Projects/activities in Indian Country," www.muspin.gsfc.nasa.gov, 1997).

Pacific Northwest Regional Medical Library at the University of Washington Project: Planning and Evaluating Health Information Outreach to Native Americans and Other Underserved Communities

The purpose of this project is to develop models of health information outreach that will support systematic evaluation of the implementation and impact of outreach programs sponsored by NLM. The project will: formulate clear, measurable objectives for information outreach to minority or underserved communities, including American Indians and Alaskan Natives; develop outreach models; assess the strength and depth of the variables and relationships in the models; develop an evaluation instrument; offer a continuing education course; and test the model(s), instrument, and guide. The Native American community in the Pacific Northwest (including Alaska) will be involved in all phases of this project. Contact: Sherrilynne Fuller, Ph.D. University of Washington 206-616-5808. (Source: "Electronic Communications Projects/activities in Indian Country," www.muspin.gsfc.nasa.gov, 1997).

Impact of Telemedicine Technologies and Applications on the Health Care System in Rural Alaska

The objectives of this project are to replicate existing and developed Alaska Telemedicine testbeds by modifying, interfacing, and expanding successfully deployed telemedicine technologies, and to evaluate the impact of these technologies on the health care system in rural Alaska for cost, quality of care, and access to care by rural Native Alaskans where and when it is needed. Contact: Frederick W. Pearce, Ph.D. University of Alaska at Anchorage, 909-786-4183. (Source: "Electronic Communications Projects/activities in Indian Country," www.muspin.gsfc.nasa.gov, 1997).

Project to Provide Vital Health Information to Health Professionals in Rural and Urban Settings Across the Northwest

The University of Washington Academic Medical Center regional telemedicine network will connect health professionals and patients from big cities, small towns, and vast expanses of sparsely populated areas of Washington, Wyoming, Alaska, Montana, and Idaho to provide timely access to vital health information. The University of Washington will link clinical and public health partners at selected sites in this five-state area via a regional telemedicine network that includes a World Wide Web interface to electronic medical records; secure clinical e-mail for clinician-to-clinician and clinician-to-patient interactions; electronic delivery and management of x-rays and other clinical images; and access to medical library resources, such as MEDLINE and full-text journals. This innovative network will allow clinicians to consult with one another, health professionals and their patients to confer, and all to access medical information. (Source: "Electronic Communications Projects/activities in Indian Country," www.muspin.gsfc.nasa.gov, 1997).

Tribal Connections Project

The Regional Medical Library at the University of Washington has received special funding from NLM to help from 10 to 12 tribes and Native villages in Alaska, Idaho, Montana, Oregon, and Washington connect to the Internet. The aim of this project is to provide access to health information, thus minimizing isolation and improving access to remote social and health resources. This project will work with the many agencies, programs, schools, and departments on reservations and in Native villages that have a stake in the health of their communities. Connectivity to the Internet will be planned so that tribal resources will be leveraged and optimal benefits will be delivered from Internet information resources and communication within the community. (Source: www.tribalconnections.org, 1999).

NATIVE-OWNED BUSINESSES

The following businesses and organizations represent only a portion of those that exist in Indian Country. A full directory would extend beyond the scope of this work.

Two sources that may provide a more comprehensive list of Indian-owned businesses are the Small Business Administration (which houses a database of information on minority businesses eligible for government contracting) and regional business directories, such as the Northwest Native American Business Directory.

BUSINESSES

COMPUTERS AND NETWORKS

Accutech Northwest
9400 SW Barbur Blvd.
Portland, OR 97219
Tel: 503-245-7530
Fax: 503-245-2776

Computer service and sales to government and corporate clients.

AmerInd, Inc.
1310 Braddock Place
Alexandria, VA 22314-1648
Point of Contact: Tony Karnas
Phone: 703-836-5900
Fax: 703-836-8691

Enterprise engineering, intelligent information systems & systems engineering and integration

CN/NET Chickasaw Nation Internet Services and Smoke Signals Computer Company
1500 North Country Club Road
Ada, OK 74820
Tel: 580-332-0033 or toll-free 888-266-3844
www.chickasaw.com

Internet services and training; computer products and services

Laducer & Associates, Inc.
201 Missouri Drive
Mandan, ND† 58554
Tel: 701-667-1980
Fax: 701-667-2970
www.laducer.com

Computer-specific information management services, including business development, project management, technical assistance, financial assistance, market research, feasibility studies, and procurement support.

Straight Arrow Computers, Inc.
737 North Adams Street
McMinnville, OR 97128
Tel: 503-434-4319
Fax: 503-434-5462

Computer sales, service and support networking, including software and hardware installation and printer maintenance.

Uniband Inc. (a business of the Turtle Mountain Band of Chippewa Indians)
P.O. Box 1059 Hwy 5 West
Belcourt, ND 58316
Tel: 701-477-6445 or toll-free: 800-254-0650†
Fax: 701-477-6448
www.uniband.com

LAN telecommunications support and microcomputer, Internet/Intranet, and software support services are offered through locations in Albuquerque, NM and Washington, DC. In addition, document imaging, telemarketing and data entry services are offered in Belcourt, ND and in various locations around the state and across the country.

GIS/GPS

Timberhill Mapping
2255 NW 25th Street
Corvallis, OR 97330
Tel: 541-753-6851
Fax:541-753-6851

GPS and mapping services for industries in the natural resources and utilities areas.

INTERNET SERVICES AND WEB SITE DEVELOPMENT

ATIIN, Inc.
One Technology Center
1155 University Blvd SE
Albuquerque, NM 87106
Tel: 505-843-4292
Fax: 505-246-2891
webmaster@atiin.com
www.atiin.com

Web services; telecommunications infrastructure and Web technology consulting; Web technology training

CN/NET Chickasaw Nation Internet Services and Smoke Signals Computer Company
1500 North Country Club Road
Ada, OK 74820
Tel: 580-332-0033 or toll-free 888-266-3844
www.chickasaw.com

Internet services and training; computer products and services

INDIANnet
Native American Public Telecommunications (NAPT)
P.O. Box 83111
Lincoln, NE 68501
Tel: 402-472-3522
Fax: 402-472-8675
native@unlinfo.unl.edu
http://indiannet.indian.com/

Web site development

Red Road Web Development Co.
1545 Holly St.
Denver, CO 80220
Tel: 303-321-3318
wawells@redroad.net
www.redroad.net

Internet service provider and web development

TELECOMMUNICATIONS/MICROWAVE/CELLULAR

ATIIN, Inc.
One Technology Center
1155 University Blvd SE
Albuquerque, NM 87106
Tel: 505-843-4292
Fax: 505-246-2891
webmaster@atiin.com
Internet: www.atiin.com

Web services; telecommunications infrastructure and Web technology consulting; Web technology training

Mescom Enterprises, Inc.
(subsidiaries: Nansat, Mescom Telecommunications, Nansys, M.S.D. and Iowa Hill Telephone Company)
Headquarters Office
P.O. Box 18040
San Jose, CA 95158
Tel: 800-298-0123
Fax: 800-756-3726

Family of companies that provide services including: telecommunications systems, satellite networks, network systems, teleconferencing and data transfer, automatic teller machine and point of sale terminals.

Pacific Natcom, Inc.
Emily Doss (Itsatawi of Pit River), President
P.O. Box 4196 or1055 Mt. Hood Ave.
Salem, OR 97302
Woodburn, OR 97071
Tel: 503-982-5058
Fax: 503-982-5157

Cellular microwave and tower service

Spirit Communications, Inc.
Clyde L. Stryker, CEO & President
20493 SW Avery Ct.
Tualatin, OR 97062
Tel: 503-612-0600
Fax: 503-692-0914
www.spiritcommunications.com

Data and voice wiring, data electronics, fiber optics, telephone systems, office furniture, surveillance equipment, southwest microwave.

United Native American Telecommunications, Inc. (UNAT)
James (Jim) Bradley, President
331 E. 87th Avenue
Anchorage, AK 99515
Tel: 907-349-7017
Fax: 907-349-7019
www.unat.com

Founded in 1992, UNAT operates as a public utility and is licensed by the FCC as an interstate long-distance company. It provides telecommunications services in the U.S. and internationally, and has recently joined in partnership with Electronic Data Systems Corporation (EDS) to provide a variety of telecommunications services to rural Alaskan communities.

- Services: network engineering design; project management; network construction and installation; research; ongoing service and support; sales and marketing support; customized telecommunications training; and tele-fraud and security reviews.
- Products: voice, data, and video network design and integration using fiber optics, wireless, and satellite communications technologies.
- Customers/projects: U.S. Military, United Nations, Pacific Air Forces.

TRIBAL TELEPHONE COMPANIES

Cheyenne River Sioux Tribe Telephone Authority
J.D. Williams, Director
P.O. Box 810
Eagle Butte, SD 57625-0810
Tel: 605-964-2600
Fax: 605-964-1000
www.crstta.com

The C.R.S.T. Telephone Authority is wholly owned by the Cheyenne River Sioux Tribe and has been in business since 1958. Its service area covers 4,600 square miles in which 2,600 access lines serve 19 communities. The company has 90 miles of fiber optic cable that connects long distance toll-handling facilities and modern digital switching in five exchanges. Services provided include: long distance telephony, Internet connectivity and service, paging, cable, direct-to-home satellite service, cellular phone service and, through its divisions, office supplies and equipment and propane gas sales. In addition, C.R.S.T. has holdings in the South Dakota Network (which handles toll traffic switching) and Express Communications, Inc. (a toll marketing company).

Gila River Telecommunications, Inc. (GRTI)
Darrell Gerlaugh, Chairman
Board of Directors
Box 5015
7065 W. Allison Drive
Chandler, AZ 85226-5135
Tel: 520-796-3333
Fax: 520-796-7534
www.gilanet.net

GRTI was established in 1988 and currently has

more than 3,000 lines, including business, residence, and private line circuits. Approximately 48 percent of these are business lines. The state-of-the-art telecommunications system currently consists of seven central offices (with plans for an eighth), equipped with Nortel DMS10 digital switching equipment. Fiber optic cable connects all central offices, and serves 10 Digital Loop Carrier concentrator units. The total system consists of approximately 117 miles of fiber optic cable and 342 miles of buried copper cable. GRTI offers customers optional calling plans and services such as Centrex, CLASS, and Custom Calling features.

Other enhanced services offered by GRTI are cellular, paging, Internet, and Satellite TV (DBS). New services being planned include Voice Mail and ISDN. The company is finalizing its own telephone directory as well.

GRTI is also a 25-percent owner of the Gila River Cellular General Partnership, serving the Rural Service Area 5 in Arizona. The service area includes a portion of the Interstate 10 corridor between Phoenix and Tucson, as well as all of Pinal and Gila counties.

Hopi Tribe
Wayne Taylor, Vice Chairman
P.O. Box 123
Kykotsmovi, AZ 86039
Tel: 520-734-2441
Fax: 520-734-2435

(Currently in development).

Ft. Mojave Telecommunications, Inc.
Jose Matanane, Acting General Manager
P.O. Box 9879
Ft. Mojave, AZ 86427
Tel: 520-330-2500
Fax: 520-330-2525

Fort Mojave Telecommunications was established as a tribally chartered company in 1988 and currently provides telecommunications and cable television service to four exchanges in Arizona, California, and Nevada. FMTI has 609 active service lines and its network is connected with 26 miles of fiber optic cable and terminal equipment. Because of its network flexibility (add/drop optic equipment and digital line carrier), FMTI can provide total digital service to any location on the reservation. In addition, FMTI provides 24-hour emergency service, 7 days a week.

Navajo Nation Communications & Utility
Delfred Smith, Director of Communications Utilities
P.O. Box 2892
Window Rock, AZ 86515
Tel: 520-871-7740
Fax: 520-871-7741

(Currently in development).

Tohono O'Odham Utility Authority
P.O. Box 816
Sells, AZ 85634
Internet: www.toua.net
Tel: 520-383-2236
Fax: 520-383-2218
www.toua.net

In May 1970, the Papago Tribal Utility Authority was formed by Tribal Resolution to operate electric, water, and wastewater utilities. In 1987, what was then called PTUA took over communications service and became the Tohono O'Odham Utility Authority (TOUA). At that time there were 324 customers; today there are 2,300 telephone customers. In September 1996, TOUA became a local Internet provider to service the Tohono O'odham Nation.

Members of the management board include: Lester S. Ormsby, Director; Alfred R. Williams, Director; Lyle L. Donavan, Chairman; George Esquivel, Director; Harriet Toro, Treasurer; and Virgil Lewis, Secretary.

San Carlos Apache Telecommunications Utility (SCATU)
Brent Kennedy, General Manager
Box 158
San Carlos, AZ 85550
Tel: 520-475-2433
Fax: 520-475-9946

In 1994, the San Carlos Apache Tribal Council established SCATU. Now in the early stages of operating an independent telephone company, SCATU purchased the 475/San Carlos Exchange (which exists completely within reservation boundaries) from US West in 1997 and today serves 714 subscribers. Additional subscribers and service areas within the reservation boundary are provided service from off reservation central offices (US West) and will be acquired in the near future. Plans have also been made to secure loan funds to replace existing central office equipment with a new digital switch host, which will provide toll recording, equal access, SS7 and wide band capabilities on the new host switch. Additionally, SCATU will install two digital remote switches and upgrade the existing toll interconnect facilities to fiber optic cable. While this is being done, SCATU will also provide subscriber cable to the underserved areas of the reservation. The 714 customers represent only one-fourth of the projected customer base.

TELECOMMUNICATIONS AND TECHNOLOGY ORGANIZATIONS (NATIVE-OWNED AND NATIVE-FOCUSED)

American Indian Higher Education Consortium (AIHEC)
121 Oronoco Street
Alexandria, VA 22314
Tel: 703-838-0400
Fax: 703-838-0388
www.aihec.org

Distance-learning consortium utilizing satellite networks with membership of 31 tribal colleges and educational institutions, including the American Indian College Fund.

American Indian Science and Engineering Society (AISES)
Sandra Begay-Campbell, Executive Director
5661 Airport Blvd.
Boulder, CO 80301-2339
Tel: 303-939-0023 ext. 23
bioc02.uthscsa.edu/aisesnet.html

AISES is a private, nonprofit organization that nurtures building of community by bridging science and technology with traditional Native values. Through its educational programs, AISES provides opportunities for American Indians and Alaska Natives to pursue studies in science, engineering, business, and other academic arenas. The trained professionals then become technologically informed leaders within the Indian community. AISES is a membership organization that is divided into several regions. It has more than 3,100 members in various categories, including science and engineering professionals, college and pre-college students, and other supporters.

Programs and activities include:

- Career placement services for college students: A resume database, on-line placement services, and a summer internship program have been developed by AISES, and more than 30 students have been placed in federal agencies. This program is expected to expand significantly in coming years.
- College Success Program: With funding from the Intel Corporation and in partnership with the Gila River Reservation and the Santa Fe Indian High School, AISES is launching the College Success Program to increase retention among first-year college students in the Southwest. This program promises to become a model for nationwide expansion.
- Through the AISES-U.S. Department of Transportation Cooperative Agreement, AISES provides information and services to Minority Business Enterprises, including tribal and Indian-owned businesses in the states of Colorado, Utah, Wyoming, Montana, North Dakota, and South Dakota.

Electronic Pathways
Connie Buffalo (Chippewa), Executive Director
John J. Hoover, Ph.D., Director of Educational Programs and Evaluation
University of Colorado
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Boulder, CO 80309
Tel: 303-492-5593
Fax: 303-492-1585
http://hanksville.phast.umass.edu/defs/independent/ElecPath/elecpath.html
elpath@stripe.colorado.edu

Electronic Pathways is a national nonprofit organization whose primary mission is to ensure that underrepresented and underserved individuals, schools, and communities have equal access and opportunity to fully participate in the advantages of today's technological and information age, with a particular emphasis on mathematics and science educational reform as well as career development.

Electronic Pathways works with other organizations with a similar mission to provide high quality training, products, and other support to educators, community members, and business people to facilitate their effective use of technology to improve teaching and learning, quality of life, career development, and business efficiency in underserved communities.

Projects include:

- Native American Community Alliance and Technology Project
- Career Communications Network for Women and Girls (WORKREADY)
- Environmental Science Careers for Women

The Falmouth Institute, Inc.
Richard Phelps, President
3702 Pender Drive, Suite 300
Fairfax, VA 22030
Tel: 703-352-2250 or toll-free: 800-992-4489
Fax: 703-352-2323
www.falmouthinst.com

The Falmouth Institute is a nationally known and respected training and consulting organization that provides quality training courses, consulting, and cost-effective technical assistance to American Indian and Alaska Native communities. The Institute offers hundreds of workshops and courses every year on topics ranging from Indian law and sovereignty to management and professional development, and publishes the "American Indian Report" monthly.

Interagency American Indian Telecommunications Infrastructure (IAITI) Working Group
Primary Contact:
Danny Gogal
EPA Environmental Justice Office
Tel: 202-564-2576

The Office of Environmental Justice at the EPA established the IAITI Working Group in January 1997 in response to the growing need for tribal access to the government's electronic data and information. The mission of the Working Group is to discuss, plan, and coordinate the programs and activities of federal agencies that involve tribal governments, communities, and organizations in efforts to enhance telecommunications in Indian Country. The objectives are to:

- provide a forum for federal agencies to share information regarding their telecommunications plans, projects, and activities in Indian Country;
- support and facilitate coordination among federal agencies, and encourage more effective and efficient use of federal resources in strengthening telecommunications in Indian Country;
- seek input and guidance from tribal government officials, communities, and organizations regarding the nature and extent of the programs and activities of federal agencies on telecommunications in Indian Country; and
- communicate information about federally sponsored telecommunications activities and projects in Indian Country to all interested parties, particularly to tribal governments, and to all interested federal agencies.

The IAITI meets quarterly and has representation from 11 federal agencies.

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The Institute for Community Information Resources is a division of CSU Monterey Bay. The Institute promotes the academic study of civic networking. Currently, the ICN has three projects underway: the INDIANnet Census Information Project, the Native American Public Telecommunications Worldwide Web site Project, the Cradleboard Indian On-Line Education Project, and the National Museum of the American Indian Technology Plan.

Intertribal Council On Utility Policy (ICOUP)
Pat Spears, President
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pnspears2@aol.com

Robert P. Gough, Secretary
P.O. Box 453
River Falls, WI 54022
*Tel: 715-426-1415 *51*
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ICOUP was formed in 1995 to increase the dialogue between individual tribal governments and the federal government regarding tribal opportunities, rights, and obligations as they relate to telecommunications and other utility issues. As President, Pat Spears has led this effort by working directly with tribes and representing the tribal perspective on the Local and State Government Advisory Committee of the FCC.

Intertribal GIS Council
Bill Northover, IGC Chairman
Confederated Tribes of Umatilla
P.O. Box 638
Pendleton, OR 97801
Tel: 503-276-3447
Fax: 503-276-3317

The Intertribal GIS Council (IGC) is a national Native nonprofit organization dedicated wholly to promoting tribal self-determination by improving management of geographic information and building intertribal communications networks. The IGC was established in 1993 to educate Native people and tribal organizations about the many applications of spatial data technology, and to promote the successful use of GIS for effective management of native land and associated natural, human, and cultural resource values.

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Confederated Salish & Kootenai Tribes
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Crystal Bond, IGC Treasurer
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MIGIZI Communications, Inc.
3123 East Lake Street
Minneapolis, MN 55406
Tel: 612-721-6631
Fax: 612-721-3936
postmaster@migizi.org
www.migizi.org

MIGIZI Communications is a nonprofit organization providing services to the American Indian community. Its mission is to provide information to the public; educate elementary, secondary, and adult students using the tools of communication; and commit resources to address problems in partnership with the American Indian community.

Native American Public Telecommunications (NAPT)
Frank Blythe, Executive Director
P.O. Box 83111
Lincoln, NE 68501
Tel: 402-472-3522
Fax: 402-472-8675
www.nativetelecom.org

The mission of NAPT is to inform, educate, and encourage the awareness of tribal histories, cultures, languages, opportunities, and aspirations through the fullest participation of American Indians and Alaska Natives in creating and employing all forms of educational and public telecommunications programs and services, thereby supporting tribal sovereignty. Services provided include:

- **American Indian Radio on Satellite (AIROS):** a national distribution system for Native programming to tribal communities and to general audiences through Native American and other public radio stations, as well as the Internet.
- **INDIANnet:** a partnership of NAPT and American Indians for Opportunity (AIO) provides Web site development for tribal communities.

National Indian Telecommunications Institute (NITI)
Karen Radney Buller, President
110 N. Guadalupe, Suite 9
Santa Fe, NM 87501
Tel: 505-986-3872
Fax: 505-989-4271
www.niti.org

NITI is a Native-founded and run organization dedicated to using the power of electronic technologies to provide American Indian and Alaskan Native communities with extensive educational tools, equal opportunity, and a strong voice in self-determination. Projects and services include teacher support and curriculum development, Internet training, Web design, Web site storage, listserv management for indigenous groups, on- and off-site technical support, and specialized listserv set-up.

National Tribal Telecommunications Alliance (NTTA)
Darrell Gerlaugh, President
J.D. William, Vice President
Box 5022
7065 W. Allison
Chandler, AZ 85226
Tel: 520-796-NTTA
Fax: 520/796-7535

The NTTA was formed in 1997 and is currently composed of five tribally owned and operated companies and two tribal telephone entities in development. The purpose of the organization is to provide a forum for tribally controlled telephone companies to share business growth opportunities, discuss effects of regulation on industry, and address issues affecting tribal telephone companies. Member companies are: Gila River Telecommunications, Inc.; Cheyenne River Sioux Telephone Authority; Fort Mojave Telecommunications, Inc.; Tohono O'Odham Utility Authority; San Carlos Telecommunications, the Hopi Tribe and the Navajo Nation.

National Museum of the American Indian (NMAI)

Rob Billingsley
470 L'Enfant Plaza, Suite 7103
Washington, DC 20560
Tel: 202-287-2525
Fax: 202-287-2033
rob@ic.si.edu

Technology development at NMAI, along with other technology programs at the Smithsonian Institution, incorporates multimedia and the Internet to present cultural information.

Plans for NMAI technology include access to internal sources of information (including descriptions of objects in the museum's one-million-object collection) and to other cultural sites on the World Wide Web. NMAI is a multisite museum, with an exhibit facility in Manhattan, NY (the George Gustav Heye Center); a research facility in the Bronx, NY (whose collection will begin to move to a new research center in Suitland, MD opening in 1999); and a new museum on the Washington National Mall in the year 2002.

Linking all of these facilities together as one enterprise will always be of primary importance to the museum's technology program. Further, the multimedia nature of Native American cultural materials (art, crafts, song, dance, and story-telling) clearly supports the development of an advanced multimedia technology program incorporating the Web, wireless communications, digital imaging (both still and moving), distance learning, and video teleconferencing. For example, the museum's community services program hopes to use distance learning, radio broadcasting, and video teleconferencing as enabling technologies for training and cultural presentations. These presentations will then help to link NMAI with Native and non-Native communities, tribal museums, and schools. Ultimately, the museum's goal is to use this technology as a means to extend NMAI out to Native America, and just as important, to continue to broaden NMAI's ongoing collaboration with Native communities.

Project TribalWeb www.dragondata.com/~breed/pweb.html

Project TribalWeb is a coalition of American Indian webmasters dedicated to helping all Indian Nations and nonprofit organizations that serve the American Indian People to establish a presence on the Internet. Services provided by Project TribalWeb are completely free to qualifying organizations, and include: Web design, HTML writing, and graphic design services; and, if needed, data entry and scanning of material for the Web site requested. (The only cost will be the server space needed to house the Web site, which can be none to minimal depending on the needs of the tribe or organization).

Only legitimate American Indian Tribal organizations (federal or state recognized) or nonprofit Indian service groups may apply for a site design. The person(s) applying must represent the group in an official capacity. Project TribalWeb will not create "unofficial" sites.

Please access the Web site above for information on how you can utilize this service, or if you are an American Indian webmaster, how you can become involved in this effort.

IV. APPENDICES

APPENDIX A

Native American Telecommunications Infrastructure: Survey Instrument

A. NAME AND ADDRESS OF TRIBE, NATION, VILLAGE, OR COMMUNITY:

Name _____

Address _____

Person(s) responding to this survey:

Name _____

Address if different from above _____

_____

Phone No. _____

Fax No. _____

Internet electronic mail address _____

Dial-up electronic mail address and phone number _____

B. BASIC TELEPHONE PROVIDER AND SERVICE

Name and address of telephone company(ies) serving your reservation, village, or community:

Name _____

Address _____

Phone No. _____

Fax No. _____

Is this telephone company (write 'yes' where applicable):

____ fully tribally owned?' ____ partially tribally owned?

____ tribally operated? ____ staffed by tribal members?

What percentage of tribal homes and businesses have telephones?

____ % homes ____ % businesses

For homes without phones, which reasons apply? If more than one reason applies, please rank 1, 2, 3 . . . where 1 is the most important.

____ do not want phone ____ phone service too expensive

____ phone service not available ____ other reason (please state)

_____

Please indicate the type of telephone services available to tribal homes and businesses (write 'H' for homes, 'B' for businesses, 'H-B' for both).

____ basic single-line service ____ basic party-line service

____ touchtone service ____ call-waiting service

____ voice mail service ____ digital data communication

C. OTHER TELECOMMUNICATION APPLICATIONS

Please indicate which of the following telecommunication and information services are used by your local high school, community college, library, hospital, and tribal government (write 'S' for local K-12 school, 'C' for community college, 'L' for library, 'H' for hospital, and 'G' for local government):

____ personal computers ____ CD-ROM

computer networking—

____ Internet ____ electronic mail

____ electronic bulletin board

videoconferencing—

____ 1-way video, 2-way audio ____ 2-way video

____ slow scan video ____ full motion video

____ over telephone lines ____ over satellite links

____ over fiber optic link

D. PERSONAL COMPUTERS IN THE HOME AND BUSINESS

Please indicate the percentage of homes and businesses that have microcomputers and modems:

percentage with personal computers

____ % homes ____ % businesses

percentage with modems

____ % homes ____ % businesses

E. CABLE TELEVISION SERVICE

Name and address of cable television company(ies) serving your reservation, village, or community:

Name _____

Address _____

Phone No. _____

Fax No. _____

Is this cable TV company (write 'yes' where applicable):

____ fully tribally owned? ____ partially tribally owned?

____ tribally operated? ____ staffed by tribal members?

What percentage of tribal homes have cable TV?

____ % homes

(continued on next page)

For homes without cable TV, which reasons apply? If more than one reason applies, please rank 1, 2, 3... where 1 is the most important.

____ do not want cable TV
____ cable TV service too expensive
____ cable TV not available
____ other reason (please state)

For areas with cable TV service, please indicate:

____ number of channels of basic TV service

____ number of public access channels

____ number of premium or pay TV channels

F. OVER-THE-AIR BROADCASTING SERVICES

____ Does your area receive over-the-air broadcast television signals (yes or no)?

____ If yes, how many channels can be received?

____ % What percentage of tribal homes have a television?

For homes without a TV, which reasons apply? If more than one reason applies, please rank 1, 2, 3... where 1 is the most important.

____ do not want TV
____ cannot afford TV set
____ too few or no TV signals available
____ other reason (please state)

____ Does your area receive over-the-air radio signals (yes or no)?

____ If yes, how many stations can be received?

____ % What percentage of tribal homes have a radio?

For homes without a radio, which reasons apply? If more than one reason applies, please rank 1, 2,3... where 1 is the most important.

____ do not want radio

____ cannot afford radio receiver

____ too few or no radio stations available

____ other reason (please state)

____ Does your area have a local radio station (yes or no)?

If yes, is this radio station (write 'yes' where applicable):

____ fully tribally owned?
____ partially tribally owned?
____ tribally operated?
____ staffed by tribal members?

Name and address of local radio station:

Name _____

Address _____

Phone No. _____

Fax No. _____

G. DIRECT BROADCAST SATELLITE AND WIRELESS SERVICES

Does your area have (write 'yes' where applicable):

____ direct broadcast satellite television service?

____ satellite telephone service?

____ cellular telephone service?

____ pager service?

If yes to any of the above, please list the company(ies) providing service below:

Name _____

Address _____

Phone No. _____

Fax No. _____

H. TELECOMMUNICATIONS PLANNING

Does your tribe, village, or community have (write 'yes' where applicable):

____ a telecommunications plan

____ a telecommunications planning committee or council

____ a telecommunications training program

____ a telecommunications educational program at a community college or high school

If yes, please provide details.

_____

_____

_____

THANK YOU IN ADVANCE FOR YOUR COOPERATION.

[1] NOTE: Throughout this survey instrument, please interpret "tribe" to mean, as appropriate for your own geographic location, American Indian tribe or Nation, Alaska Native tribe or village, or Native Hawaiian community (to the extent applicable).

Source: U.S. Congress, Office of Technology, Assessment, *Telecommunications Technology and Native Americans: Opportunities and Challenges*, (www.wws.princeton.edu:80/~ota/ns20/year_f.html) OTA-ITC-621 (Washington, DC: U.S. Government Printing Office, August 1995), Appendix C.

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APPENDIX B

Glossary of Telecommunications Terms

LEGISLATIVE/REGULATORY

- **Access Charge:** charges long distance providers pay to local telephone service providers for use of the local network to complete long distance calls. In 1996, the largest local exchange carriers, including the Bell Operating Companies and GTE, received about $23 billion from interstate access service charges.
- **Access Line:** the circuit between a telephone subscriber and the local switching center.
- **Advanced Television Services:** television services provided using digital technology.
- **High Definition Television (HDTV):** refers to digital systems that offer approximately twice the vertical and horizontal resolution of standard analog systems available today. Standard Definition Television (SDTV) refers to digital systems with approximately equal resolution of standard analog systems available today.

Affiliate: a company that (directly or indirectly) owns or controls at least 10% of another company.

Basic Service: the minimum set of capabilities deemed necessary for use of the public telecommunications network. Current basic service includes an access line (usually one-party, analog, rotary dial), access to local and long distance calling, access to emergency calling (911), and access to voice/nonvoice relay service.

Bell Operating Company (BOC): a local telephone company formerly owned by AT&T.

Cable Service: one-way transmission of video programming to subscribers.

Calling Number Identification Service (CNI): caller ID. With a display unit attached to a telephone and subscription to this service, a caller's number is identified on incoming calls.

Common Carrier: an entity that provides a public communications conduit without regard to content.

Customer Premises Equipment (CPE): equipment employed on the premises of a person (other than a carrier) to originate, route, or terminate telecommunications.

Flat Rate Service: set monthly fees for unlimited service.

Dialing parity: a company that is not an affiliate of a local phone company is able to provide phone services in such a manner that customers have the ability to route their calls automatically without the use of any access code.

Eligible Telecommunications Carrier: a telecommunications carrier is eligible to receive universal service support if it offers phone service to all customers throughout a service area without preference and it advertises the available supported services through the mass media.

Exchange Access: the offering of access to telephone exchange services or facilities for the purpose of the origination or termination of telephone toll services.

Information Service: the offering of a capability for generating, acquiring, storing, transforming, processing, retrieving, utilizing, or making available information via telecommunications; it includes electronic publishing, but does not include any use of any such capability for the management, control, or operation of a telecommunications system or the management of a telecommunications service.

Interconnection: equal access to networks between incumbent and competitive local exchange carriers.

Interexchange Carrier (IXC): telecommunications providers that provide service between local service areas.

Interlata Service: telecommunications between a point located in a local access and transport area (LATA) and a point located outside such an area.

Internet: an international network of computer networks with common protocol standards.

Local Access and Transport Area (LATA): a contiguous geographic area established before the Telecommunications Act of 1996 by a Bell operating company such that no exchange area includes points within more than one metropolitan statistical area, consolidated metropolitan statistical area, or state.

Local Exchange Carrier: any company that is engaged in the provision of telephone exchange service or exchange access.

Network element: a facility or the equipment used in the provision of a telecommunications service. The term includes subscriber numbers, databases, signaling systems, and information sufficient for billing and collection or used in the transmission, routing, or other provision of a telecommunications service.

Number portability: allows consumers remaining at the same location to retain their existing telephone numbers when switching from one carrier to another.

Public Rights-of-Way: use of public resources for creation or maintenance of infrastructure.

Telecommunications: the transmission, between or among points specified by the user, of information of the user's choosing (including voice, data, image, graphics, and video), without change in the form or content of the information.

Telecommunications Carrier: any provider of telecommunications services. A telecommunications carrier shall be treated as a common carrier under this Act only to the extent that it is engaged in providing telecommunications services.

Telecommunications Equipment: equipment, other than customer premises equipment, used by a carrier to provide telecommunications services, and includes software integral to such equipment (including upgrades).

Telecommunications Service: the offering of telecommunications for a fee directly to the public, or to such classes of users as to be effectively available directly to the public, regardless of the facilities used.

VChip: a device which can be programmed to block programming from being viewed on a television. All TV sets sold in America have included the VChip since January 1, 1998. A complementary ratings system of television programming debuted in January 1997.

TECHNICAL

Archie: A utility that allows one to search for files on publicly accessible sites. Archie stores a database of ftp sites that allow "anonymous" public access as well as the available files.

ADSL: asymmetric digital subscriber line. A line, similar in appearance to a regular telephone line, enables a telephone company to deliver digital video to subscribers at about 1.5 Mbps—adequate for VCR quality video. Current versions can reach 6 Mbps.

Bandwidth: The transmission capacity of a telecommunications link (e.g., 64 kbps). In computer networks, greater bandwidth indicates faster data-transfer capabilities.

Bit: A binary digit, the smallest unit of information in a computer, represented as a 0 or 1. One character is typically seven or eight bits in length.

bps: Bits per second, used to refer to transmission speeds of sending data (e.g., 2400 bps, 14,400 bps, etc.). Speed takes on particular importance when using on-line Internet services. See also "kbps."

Byte: A collection of bits used to form a character or some other information.

Client: End-user computer on a network (local or Internet).

Communications Protocol: A collection of rules that ensure compatibility of transmitting and receiving equipment. Protocols usually have three main parts: the method by which data is coded; the method by which codes are received; and the methods used to establish control, detect errors and failures, and initiate corrective action.

Data Compression: reduces the number of bits of information needed to store or transmit messages.

Digital Switch: a computer that electronically routes digitally encoded messages through a network. Digital switches operate faster, more effectively, and with greater flexibility than analog switches.

Direct Broadcast Satellite (DBS): video programming transmitted from a satellite directly to customers' receiving equipment.

Digital Transmission: transmission of data, audio, or video messages in discrete codes generated by computers. A discontinuous electrical signal carries digital information in binary fashion. Data is represented by a specific sequence of off-on electrical pulses

Domain: The name of a computer or network on the Internet, specifically the characters to the right of the "@" sign, indicating the organization and the type of organization (.mil: military; .org: nonprofit; .edu: educational institution; .com: commercial, etc.) that operates that domain or the physical location of the computer (i.e. .ca: Canada, .uk: United Kingdom).

E-mail: Electronic Mail. Messages are composed on computers and then sent over a network to other network users in electronic form.

Encryption: The transformation of data into a form readable only by using the appropriate key, held only by authorized parties. The key rearranges the data into its original form by reversing the encryption.

Fiber Optic Cable: bundles of thin glass filaments through which light can travel. Fiber offers greater transmission capacity with less interference than metal cables.

File Transfer Protocol (FTP): the first and most fundamental way to transfer files to and from remote computer sites. "Anonymous ftp" refers to being able to access public file archives without a password (Login: anonymous; Password: your e-mail address).

Gopher: An Internet tool developed at the University of Minnesota that offers a simple method of perusing and retrieving information on the Internet. Gopher provides an easy menu-based means of navigating and searching for useful information, without having to know exactly where the desired resources are stored. A user must have an account from an Internet service provider with direct access to the Internet. Some Gopher sites allow "telnet" logins for those without Gopher client software.

Host: On the Internet, a host, or host computer, can serve as both way station and entry point for network users. Hosts serve information to remote users, for example via World Wide Web or Gopher. They also provide access to the Internet for local users—those capable of logging in through a particular account.

Hypertext: The World Wide Web is built around this concept. Documents are formatted with special tools that permit authors to link information to other documents of relevance elsewhere on the Internet. The Web is composed of "pages," documents written in hypertext, or HyperText Markup Language (HTML). Using this information, graphic browser Mosaic or Netscape display images and text. By clicking on highlighted text, one can move to related information and images located anywhere around the world, reading and accessing countless pages of on-line information in various media (audio, video, pictures, etc.). A non-graphical browser called Lynx also enables access to Hypertext documents, with keystrokes instead of a mouse.

Integrated Services Digital Network (ISDN): a telecommunications system which converts voice, data, and video into digital signals for high speed transmission over existing telephone networks. ISDN is built on two

main types of communications channels: a B channel, which carries data at a rate of 64 Kbps (kilobits per sec.), and a D channel, which carries control information at 16 or 64 kbps. An ISDN-linked modem is about ten times faster than a standard modem connected to a regular telephone line.

kbps: Kilobits per second, e.g., 14.4 kbps.

Leased line: A dedicated telephone line for whatever purpose designated by the lessee. Leased lines are capable of higher transmission speeds for data communications than regular telephone lines and are often required for large computers with multiple users connecting simultaneously to the Internet.

Listserv: E-mail-based discussion forums on a particular topic to which e-mail users subscribe. The listserv distributes all e-mail received to the list address to each subscriber on the list, making it a powerful means of distributing information widely.

Lynx: A text-based Web browser. Lynx is a useful tool that allows users without full Internet connections to peruse and download resources on the World Wide Web, albeit without all the graphics and sound. Users must have an on-line account; at the main prompt, type lynx, and use the keystroke instructions at the bottom of the screen.

Modem: a device that converts digital signals generated by a computer into analog signals for transmission over telephone lines. Modems also convert analog signals from telephone lines into digital signals for computer use. (The term is short for modulator, demodulator.)

Newsgroup: A system for conducting discussions on the Internet. Newsgroups are like worldwide bulletin boards: mail is stored in a central location and those interested in the topic of the discussion group may read and post messages without actually receiving a copy of each posting. Unlike listservs (which automatically send messages to subscribers' mailboxes), participation in USENET newsgroups is passive, and requires "reader" software to be able to read and post.

Node: Any computer connected to a network. Typically also refers to a host computer on the Internet.

Offline: The absence of connection to another computer. In an "offline" mail system, the user reads and writes e-mail messages in an editor without a modem connection to a remote computer. Another piece of software then automatically establishes a connection to a remote host computer, sends and receives accumulated e-mail, then hangs up. This is less interactive than on-line systems, but tends to be cheaper for the user and is sometimes a necessity in areas with particularly bad telephone lines.

Online: A "live" connection to another computer. In an on-line e-mail system, a user works directly with a remote host computer, reading and sending e-mail while connected to that computer. Interactive Internet functions, like WWW and Gopher, require an on-line interface.

Point of Presence (POP): the physical location where calls are routed to for transmission by a long-distance (interexchange) carrier.

Server: The main computer on a network, including local area networks (LANs) and hosts on the Internet. So called because it "serves" software or information to the "client" computers on the network.

Service Provider: A company or other organization that provides e-mail or Internet connectivity, typically for a fee.

SL/IP and PPP: Serial Line Internet Protocol or Point-to-Point Protocol. These protocols are used to establish real "TCP/IP" Internet connections dial-up lines, as opposed to leased lines.

TCP/IP: Transmission Control Protocol/Internet Protocol. TCP and IP are two open protocol standards used among computers connected to the Internet, allowing different computer systems and platforms to share data seamlessly. TCP/IP forms the foundation for Internet communications, upon which such services as Gopher and the World Wide Web can be provided.

Telnet: A method of connecting from one host computer system to another via the Internet. Telnet allows users to log into accounts on remote systems, and retrieve text-based information from a remote host.

UNIX: The most popular operating system for host computers on the Internet. One does not need to be a UNIX specialist to tap the resources of the Internet, but it helps to know a few fundamental commands. Many of the commands are similar to those in DOS.

Veronica: A utility that searches for files located on Gopher servers. Veronica searches all known Gopher servers and keeps a database catalog. To search this catalog, simply "point" a gopher client to the University of Minnesota and look under "All the Gopher Servers in the World."

WAIS: Wide Area Information Server. A method for putting database information on-line for access across the Internet.

WWW: World Wide Web. The newest and increasingly the most popular service on the Internet, WWW is a "hypertext" information system capable of presenting multimedia information (audio, video, graphics, etc.) to those with a "direct connection" to the Internet. It requires a SL/IP, PPP, or some other dedicated Internet connection and browser software (like Mosaic or Netscape). Users without such a dedicated connection, but who still have an online account, can use a non-graphical, text-based browser called Lynx.

BROADCASTING AND CABLE

AM: Amplitude modulation.

Analog: A continuous electrical signal that carries information in the form of variable physical values, such as amplitude or frequency modulation.

Basic Cable Service: A bundle of programming services on cable systems which are regulated by local franchising authorities under the 1992 Cable Act. This will include all local broadcasting signals and PEG (public, educational, and government) access channels.

Closed Circuit: The method of transmission of programs and other material that limits its target audience to a specific group rather than the general public.

Coaxial Cable: Cable with several common axis lines under a protective sheath used for cable television signals.

Common Carrier: A telecommunications company that provides communications transmissions services to the public. Local telephone companies have been recognized as common carriers.

DBS: Direct broadcast satellite. Unlike larger and more expensive satellite receivers, DBS receivers are relatively inexpensive, can be 18 inches in diameter, and capable of delivering up to 500 TV channels. DBS signals are sent in a digital format.

Directional Antenna: An antenna that directs most of its signal strength in a specific direction, rather than at equal strength in all directions.

Downlink: Earth station used to receive signals from satellites.

FM: Frequency modulation.

Geostationary Orbit: An orbit approximately 22,300 miles above the earth where satellites circle the earth at the same rate the earth rotates.

HDTV: High definition television.

Hertz: A measurement of frequency. One cycle per second equals one hertz (hz).

ITFS: Instructional Television Fixed Service.

MDS: Multipoint distribution service.

Shortwave: Transmission on frequencies of 625 MHZ.

Transponder: Satellite transmitter/receiver that picks up signals transmitted from earth, translates them into new frequencies, amplifies them before transmitting them into new frequencies, and amplifies them before transmitting them back to the ground.

Uplink: Earth station used for transmitting to satellites.

APPENDIX C.

Additional Resources

Providing a comprehensive list of Web sites would be another publication in itself. For a more complete listing, you may perform your own search on the Internet or refer to published directories, such as the 1997-98 **"Native American Internet Guide,"** by Martha and John Crow (published by Todd Publications, www.toddpublications.com: ISBN 0-915344-78-5). This directory lists over 1,200 Web sites for Native American groups, organizations, nations, businesses, and individuals.

CodeTalk **www.codetalk.fed.us**

This Web site (named after the Native American Code Talkers, heroes of World Wars I and II) is sponsored by all federal agencies currently operating Native American programs. It is an information-sharing network for, and about, Native Americans. Examples of information provided at this site include: government program information, an electronic consultation feature, and links to other Native American Internet information.

Index of Native American Resources on the Internet
hanksville.phast.umass.edu/misc/NAresources.html

Karen M. Strom, creator and webmaster

Extensive directories of information can be found at this site, with topics ranging from art to government.

NativeNet **nilkaan.fdl.cc.mn.us/natnet**

Gary Trujillo, creator and webmaster

NativeNet is a Web site designed to promote dialogue and understanding regarding indigenous peoples of all parts of the world. It provides a set of electronic mailing lists and archives and maintains a list of references to relevant information on the Web.

NativeWeb **www.nativeweb.org**

Marc Becker, creator

This Web site is designed as a resource for indigenous peoples worldwide. It provides a resource center, a community center, e-mail lists, message boards, and job openings.

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